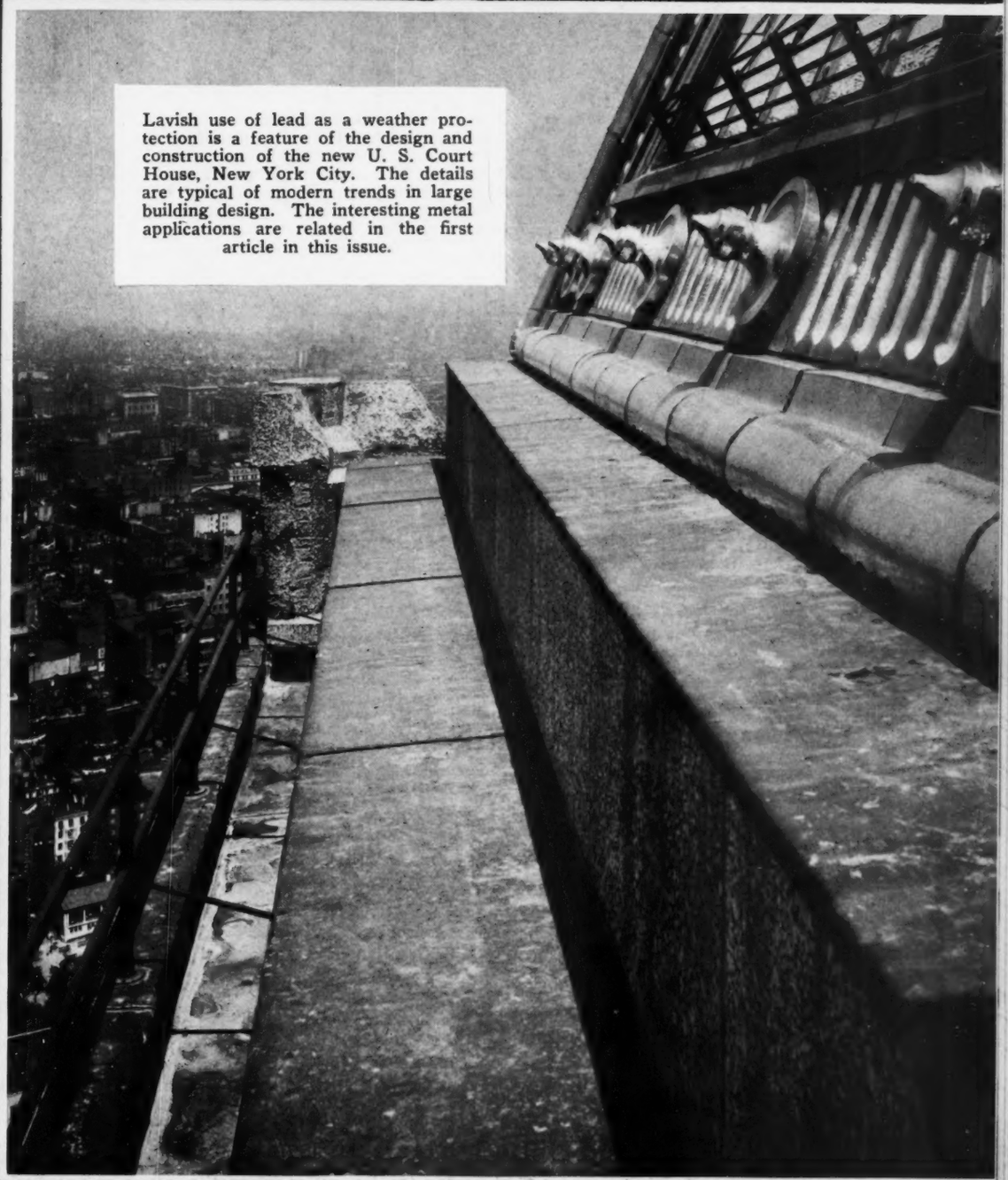
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING



Lavish use of lead as a weather protection is a feature of the design and construction of the new U. S. Court House, New York City. The details are typical of modern trends in large building design. The interesting metal applications are related in the first article in this issue.

THE AIR CONDITIONING SECTION

Page 31

ENDURO
REPUBLIC'S PERFECTED STAINLESS AND HEAT-RESISTING STEELS
Licensed under Chemical Foundation Patents Nos. 1316817 and 1339378

the *Silvery-white* metal that brings golden opportunities to sheet metal contractors

● The uses for ENDURO, Republic's Perfected Stainless Steel, are rapidly increasing. Business houses are taking advantage of its possibilities for attracting customers. You can capitalize on both.

ENDURO is a beautiful, long-lasting and really economical material for store fronts, signs, marquees, doors, counters, theater booths, stair railings and a host of other applications. It may be had in a variety of finishes ranging from a bright mirror surface to a satiny dull matte. And it never needs polishing—never wears off—stays new looking indefinitely. Modern shops have no difficulty in fabricating it.

Estimates indicate that about $50,000,000 worth of stainless steel will be sold during 1936. A substantial amount of this business will pass through the hands of sheet metal contractors. Why not go after your share—with ENDURO Stainless Steel?

Write for complete detailed information.

A FEW OF THE MANY USES FOR ENDURO

Bank fixtures...casements...columns ...doors...hardware...partitions... signs...marquees...frames...drinking fountains...stair railings...counters ...store fronts...air conditioning equipment...chutes and covers... chimney tops...flue pipe...down spouts...flashing...gutters...range hoods...window frames...screens... laundry tubs...sinks...drainboards.

Republic Steel CORPORATION

GENERAL OFFICES···CLEVELAND, OHIO
ALLOY STEEL DIVISION···MASSILLON, OHIO

When writing Republic Steel Corporation for further information, please address Department A. A.

THE WAR IS ON

THE BATTLE to place effective, modern air conditioning equipment in 10,000,000 homes in the next 10 years will be fought and won with Hold-Heet equipment.

For the first time Effective SUMMER COOLING Equipment for the Home is made available within the means of every home owner.

No longer do you need to dodge this question — and lose the sale. Hold-Heet has the answer! It means year 'round selling with immediate business and profits for you that are simply staggering.

Here is Ammunition for the Opening Guns

1. A two-color envelope stuffer that will pull the leads—it is entitled "You are Lucky if you have a Warm Air Furnace for it will Cost so Little to Air Condition Your Home."

2. A large six-page, two-color Consumer Circular for a follow-up when you get the inquiry. For the first time the story of Home Air Conditioning has been told fully and yet so simply that everyone can understand it. It shows step by step—how easily and inexpensively a home may be air conditioned—all tied up with compelling sales arguments that make it impossible for your prospects to say "no."

3. A twenty-page Sales, Service and Installation Manual so packed full of facts you should have that it literally will make you an air conditioning expert over night. Easy ways to figure jobs—dozens of diagrams—fifteen photographs of typical installations—Full of Dynamite Too—How to meet and beat all competition—How to put "radiator heating" in its place—How to place your business above all competition. Hold-Heet alone has the courage to come out in the open and show the Warm Air Heating and Sheet Metal Trade how to fight and hold their birthright in the Home Air Conditioning Business. EVERY MAN IN THE HEATING BUSINESS NEEDS THIS MANUAL.

Russell Electric Co., *Mfrs.*, 342 W. Huron St., Chicago

Every reader of this magazine—every heating dealer—every competitor needs this information. All of you are urged to send for this material. There is no obligation whatever.

Russell Electric Co.
342 W. Huron St. Chicago, Ill.
☐ Send me the Ammunition.
☐ Coupon is pinned to my letterhead to show we are in the heating business and want dealer discount quotations.

NAME .....

STREET ADDRESS .....

CITY ..... STATE .....

Your street address is essential on heavy fourth-class mailings.

In This Issue

Lately, the articles dealing with architectural metal work have seemed to indicate one thing—that architects and owners are paying close attention to the problem of eliminating deterioration due to faulty flashing. The article on page 16 is a splendid example of this trend.

*

Platte Overton takes the factory building described in last month's issue and designs a piping system —two ways. If you are interested in getting into larger building work you will like this series. See page 22.

*

Of the many varieties of furnace cleaning campaigns we have studied, the campaign described on page 26 seems to have the greatest freshness. Animated movie cartoons—how's that for an idea?

*

The last article in J. G. Dingle's series on the Social Security Act is, to our mind, the most valuable compilation of data so far examined. He takes typical shops (actual operating records) from his files and shows in tables just how much this act will cost YOU in the states where the act is now in force. See page 28 for some figures which may startle you.

*

We continue two sheet metal suggestions (Soldering Bright Metal—page 27) and (Flashing for Stucco Buildings—page 24). The recommendations presented have been carefully sifted from the mass of conjecture, old Spanish customs, old wives' tales, which go the rounds. Your experiences are invited.

*

On page 54 we present a problem in air conditioning originally laid in our lap. We side-stepped the issue just a little bit and invited recommendations by several well known engineers. Maybe you have had a similar problem. If so, your experiences and results will be gratefully received.

*

One of the interesting houses of the 1934-1935 period was the Westinghouse "Home of Tomorrow" in Mansfield, Ohio. The house was built and air conditioned by methods considered revolutionary then. The house is no longer a laboratory, but the findings are so interesting that we publish a report, even though the tests are a little old. See page 48.

*

If you have ever had a job go hay-wire because of filter troubles you'll like the first article by Professor Rowley on page 51. Here (and in the articles to follow) is some real meat on the filter question.

*

And the newest findings on the pressure losses imposed by elbows continues on page 42. The facts are worth the effort to understand every bit of information presented.

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

Vol. 105, No. 10 — October, 1936 — Founded 1880

CONTENTS

THE AIR CONDITIONING SECTION

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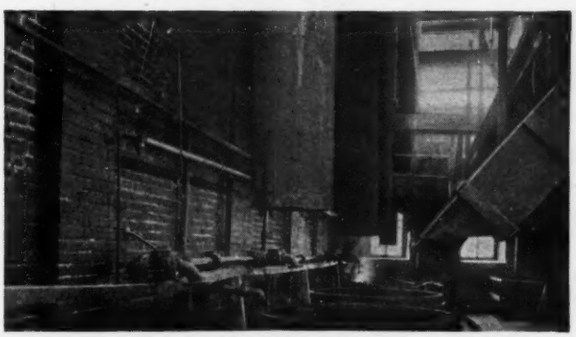
Chute the Works... AND GIVE 'EM AIR

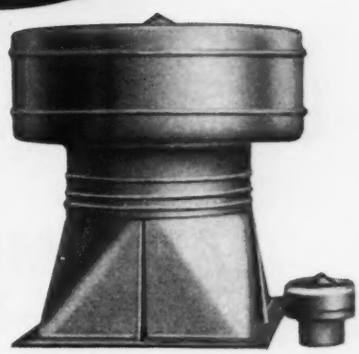
Monel Metal washing machine installation in the plant of the United Linen Supply Co., Los Angeles, Cal. The wet chutes from the washers to the extractors are Monel Metal.

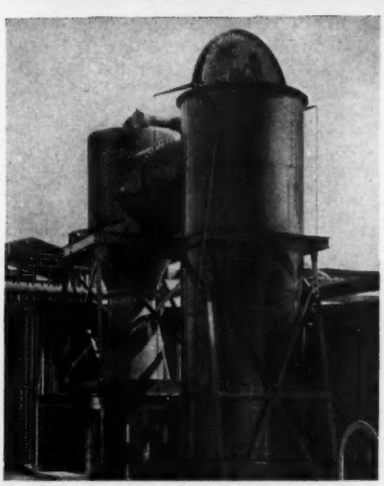


(Above) Monel Metal ventilating exhaust system over an acid tank for cadmium plating, built and installed by J. C. Lauber Co., 504 East La Salle St., South Bend, Indiana.

(Right) Monel Metal ventilator hood manufactured by The Breese Bros. Co., 2347 Reading Road, Cincinnati, Ohio.

(Left) For 18 years these Monel Metal fume ducts have withstood fumes from boiling sulphuric acid at 22-25% concentration in vats used to dissolve cotton from rubber fabrics at the plant of the Dominion Rubber Company, Ltd., Montreal. Somewhat scarred, of course, after 18 years but still good for further service.





Vapors of ferric chloride, at about 225° F., are handled by these Monel Metal stacks over the dryers at Milwaukee's municipal sewage disposal plant. They have been in service for 3 years and seem in as good condition as when installed. Stacks of other material, formerly used, lasted about 14 months.

Profits for you in the size of these jobs... laundries and factories near you need them... let them know YOU fabricate Monel Metal!

THESE pictures tell a story.... a story of profits for you.... The way metal workers got these jobs was simply by telling laundries why Monel Metal is ideal for chutes... and telling chemical plants, textile mills, rubber factories, telephone companies, food plants, and laboratories why Monel Metal ventilators give long, trouble-free service.

The reasons are much the same. Monel Metal is absolutely rust-proof. Since it resists corrosion from most acids and alkalies, its surface stays smooth, and it outlives other metals comparable in price.

And while Monel Metal is as strong and tough as steel, it is formed by all regular methods of fabricating, *welding included.*

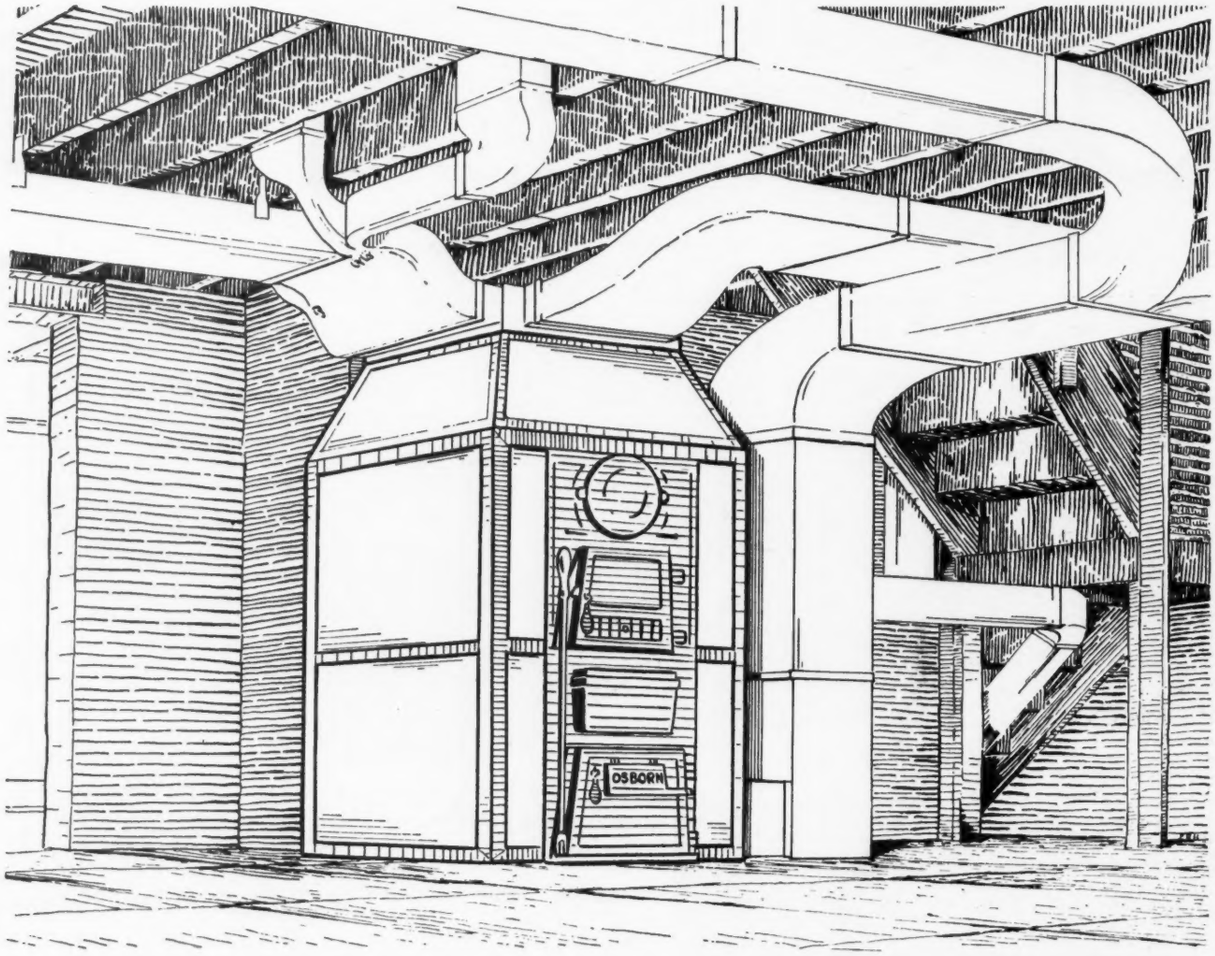
Most plant managers know these properties... all but the last. Go out and *tell* them about Monel Metal's ease of fabrication... and that YOU are the Johnny-on-the-spot who fabricates it. You'll land many jobs... all of them easy jobs... most of them big jobs. Write Inco's engineers for prices and instructions.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

MONEL METAL

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL



AUTUMN'S ROAD TO PROFITS

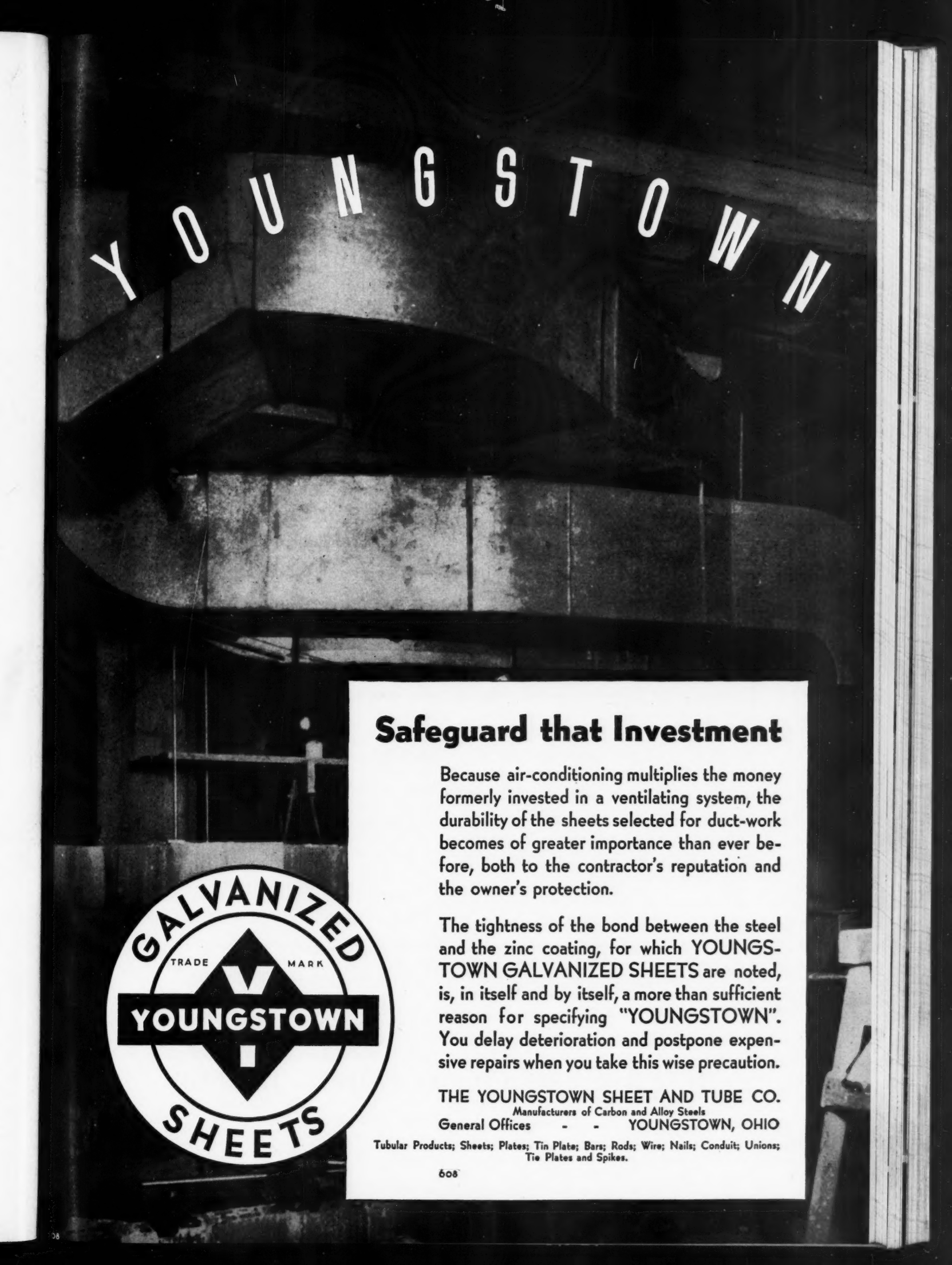
You know, of course, that this is heating season time, but do you know that every item of material you need for the successful carrying on of this fall work can be secured from one dependable source—from OSBORN?

Whether you require pipe and fittings to rebuild a simple gravity job; or a furnace, blower, duct materials, automatic humidifier and controls for a complete winter air-conditioning system — OSBORN has them. More important, especially to your customers, every product you get from OSBORN is of highest quality and a leader in its field.

If you are figuring on heating jobs—and you should because it is profitable business—figure too on using OSBORN materials. Of the thousands of sheet metal men who do, many will tell you that having this one dependable buying source is one of the biggest factors in their success.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO—CLEVELAND—DETROIT

A DEPENDABLE SOURCE OF SUPPLY FOR 78 YEARS



Safeguard that Investment

Because air-conditioning multiplies the money formerly invested in a ventilating system, the durability of the sheets selected for duct-work becomes of greater importance than ever before, both to the contractor's reputation and the owner's protection.

The tightness of the bond between the steel and the zinc coating, for which YOUNGSTOWN GALVANIZED SHEETS are noted, is, in itself and by itself, a more than sufficient reason for specifying "YOUNGSTOWN". You delay deterioration and postpone expensive repairs when you take this wise precaution.

THE YOUNGSTOWN SHEET AND TUBE CO.
Manufacturers of Carbon and Alloy Steels
General Offices - - YOUNGSTOWN, OHIO

Tubular Products; Sheets; Plates; Tin Plate; Bars; Rods; Wire; Nails; Conduit; Unions; Tie Plates and Spikes.

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Shortly after these words reach you, the President of the United States for the next four years will have been chosen. It is the calm conviction of this Company that, whichever man wins, the general economic conditions which greatly influence the lives and happiness of most Americans will continue to improve—and business will continue on the up and up. Here are three reasons:

More and more men have been and are being employed in industry because more and more industries are finding business getting better—and these workers are supplying constantly greater buying power—to keep up both industry and buying.

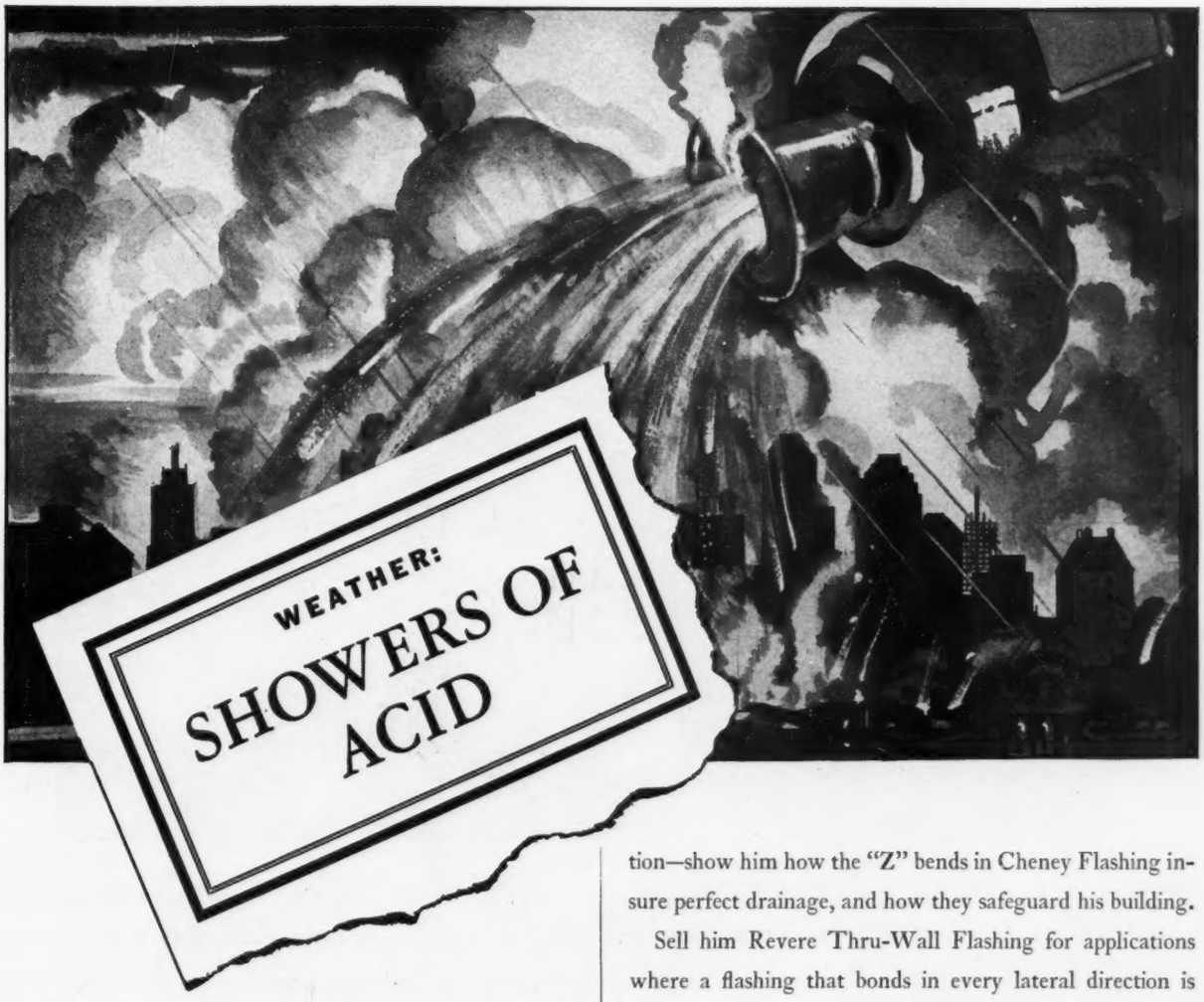
Greater farm income (greatest since 1930 except in the drought area) will help consume the products of industry—autos—plows—radios—home equipment—on farms and in farm homes. A gold mine for both small dealers and large concerns!

Because the next President will have been the choice of the majority, the majority of consumers will be confident of the future (in either case) and **it is consumer confidence and buying power that rules business conditions at all times.**

During the coming weeks, all over the country, with election over and settled, increasing thousands will be buying things and those dealers who are able to sell them new furnaces to make their homes more modern and comfortable will be making more sales and profits than they have known in years.

Get in on this business—start NOW—while others are waiting "to see what happens." Go after new home sales—and replacement sales in old homes—they will all need furnace pipe and Handy Pipe will continue to give satisfactory service long after the furore of this election has died down.

F. MEYER & BRO. CO. • PEORIA, ILLINOIS



AS SHOWN in a recent article, every city rain-storm is a shower of dilute acid—formed in the air from the products of combustion. This acid attacks roofing—shortens its life. Which is one reason why you can sell your prospects rust-proof, corrosion-resisting Cheney Flashing, Revere Thru-Wall Flashing, Revere Sheet Copper and Revere Leadtex (lead-coated copper) instead of inferior, cheap materials.

Your customer will pay for Cheney Flashing if you explain what it means to his building investment to have flashing that bonds laterally and vertically in every direction—show him how the "Z" bends in Cheney Flashing insure perfect drainage, and how they safeguard his building.

Sell him Revere Thru-Wall Flashing for applications where a flashing that bonds in every lateral direction is sufficient. Sell him Revere Sheet Copper instead of materials that rust, rot, crack and disintegrate.

Tell him about Revere Leadtex—lead-coated copper made by a process that assures even distribution of lead in ample thickness, and secures its permanent, uniform adhesion.

Sell him quality. Show him why it is not only better but less expensive. Tell him the truth—that real value means copper. Then make good on these quality sales arguments by using REVERE copper products. A near-by Revere distributor will supply you.

Revere Copper *and* Brass

FOUNDED BY PAUL REVERE
1801

INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS.
NEW BEDFORD, MASS. · ROME, N. Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

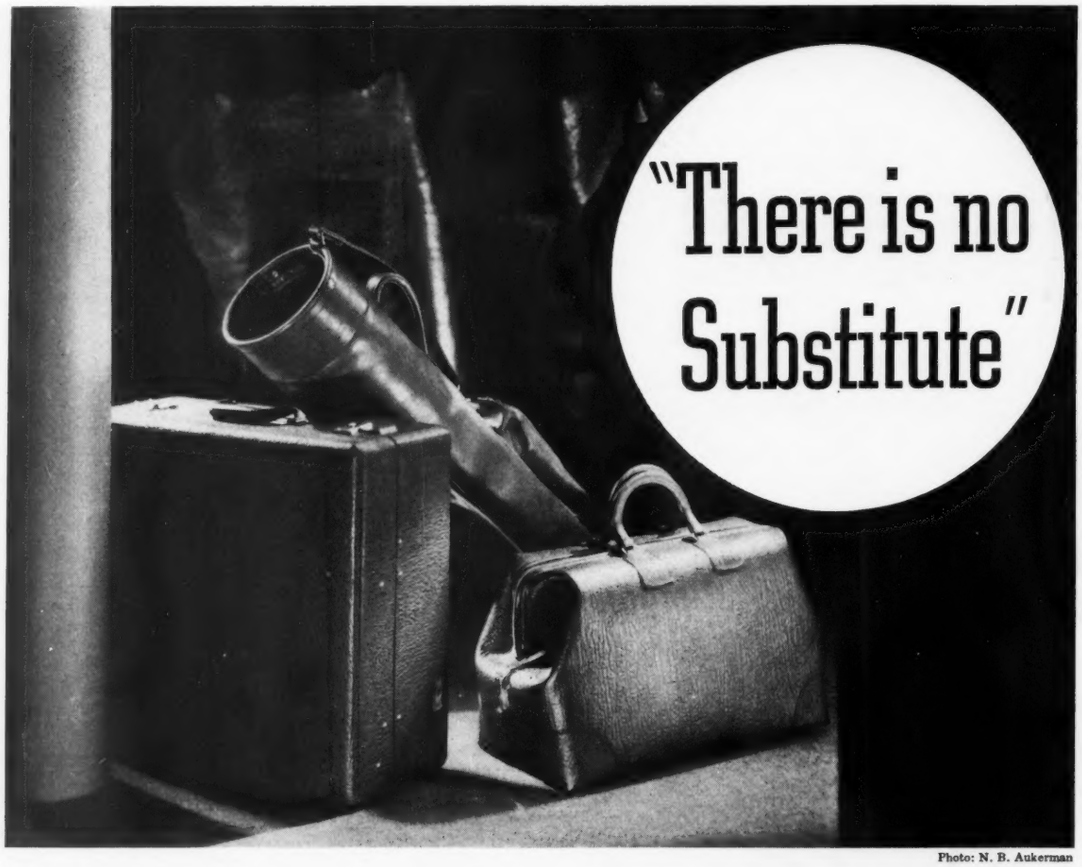


Photo: N. B. Aukerman

THERE is no substitute for real leather, its distinctive grain, its versatility and wonderful durability.

And in registers and cold air faces, there is no substitute for Independent "Fabrikated." The distinguishing qualities of Independent "Fabrikated" are strength, versatility, rigidity and extra large open area. In finishes, too, "Fabrikated" excels, being available in a great variety of oaks, lacquers and japans.

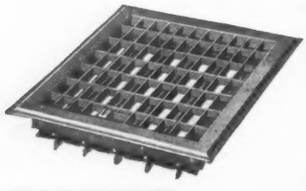
Look to Independent Register for all your register needs. You are sure to find among the many attractive designs and finishes something to meet every need. *Send for catalog.*

THE INDEPENDENT REGISTER CO.
3741 EAST 93rd STREET CLEVELAND, OHIO

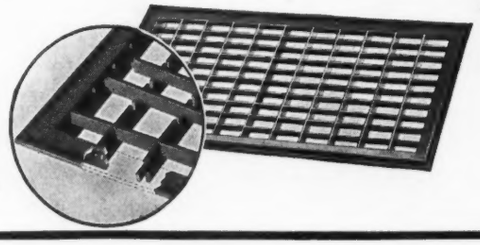
INDEPENDENT "Fabrikated" REG. U. S. PAT. OFF.

FLOOR REGISTERS AND COLD AIR FACES

AND AIR CONDITIONING REGISTERS AND GRILLES



STANDARD MESH

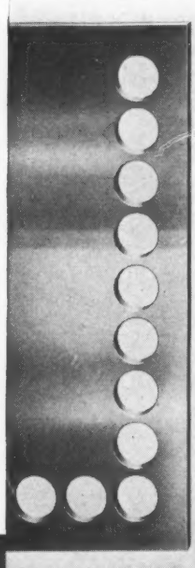


82% OPEN AREA

CLOSE MESH

ANY SIZE • ANY FINISH

It's Simple to Punch Holes - *IF*

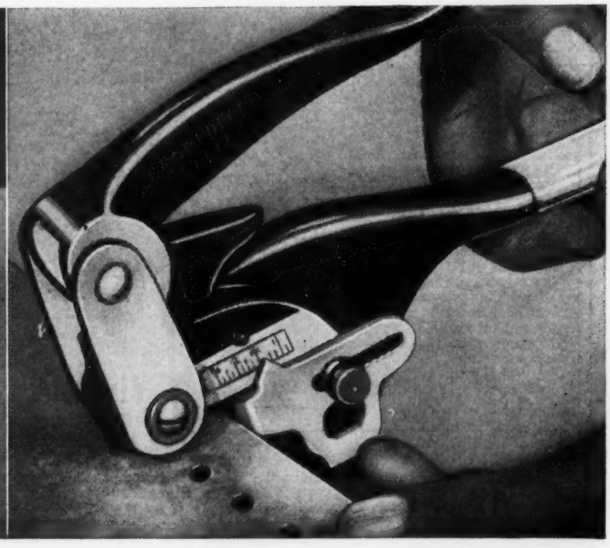


To punch holes should be one of the simplest jobs imaginable, even when holes are wanted a uniform distance from the edge of a sheet. And it is . . . IF you have a Metal Punch Outfit like this handy Hyro No. O. X.

Handiness is a big feature of this Outfit. It is just right to take along for work out of the shop and for on-the-spot duty in the shop, too. First the Punch measures only 8 inches overall and weighs but 2⅝ lbs., but is surprisingly powerful for the size. It will easily punch holes up to 17/64" in 14 gauge metal or its equivalent. Second, the Punch and a complete set of 7 punches and 7 dies come in a strong, metal carrying case.

Add to these advantages, the many superior features of the famous Hyro No. O. X. Punch . . . features like the front pointer and side gauge which save center punching . . . and you will appreciate what *a real bargain the complete outfit is at* $5.90 (*F.O.B.N.Y.*). Any sheet metal worker can afford to have it and so make certain that punching holes *will be* simple.

PARKER-KALON CORPORATION . . . 190 Varick Street, New York, N. Y.



HYRO PRODUCTS MAKE MANY JOBS, SIMPLER, BETTER

Hyro No. X. X. Metal Punch

Only combination bench and hand punch on the market . . . take it to the work or the work to the Punch. Firmly held to bench stand when desired. Write for descriptive folder.

Hyro Shur-Grip Solder Iron Handles

A few pennies extra buys this handle that screws-on the stem of an iron and STAYS ON. Saves burning-on handles; pounding to keep them tight. Won't char or break like ordinary handles. Sizes to fit irons from 1½ to 12 lbs.

Hyro Dial Damper Regulators

Thoroughly efficient and practical yet inexpensive. A popular control for small and medium size dampers. Comes in bother-saving packages with all necessary Bearings, rivets and Parker-Kalon Sheet Metal Screws.

Hyro Unxld Damper Quadrants

Commonly regarded as the standard and best damper control device for controlling medium size dampers. It comes with all parts needed for installation . . . Bearings, rivets and Parker-Kalon Sheet Metal Screws in one handy box.

Products of

PARKER-KALON CORPORATION

Sold only through recognized distributors

Announcing A BRAND NEW STEEL FURNACE

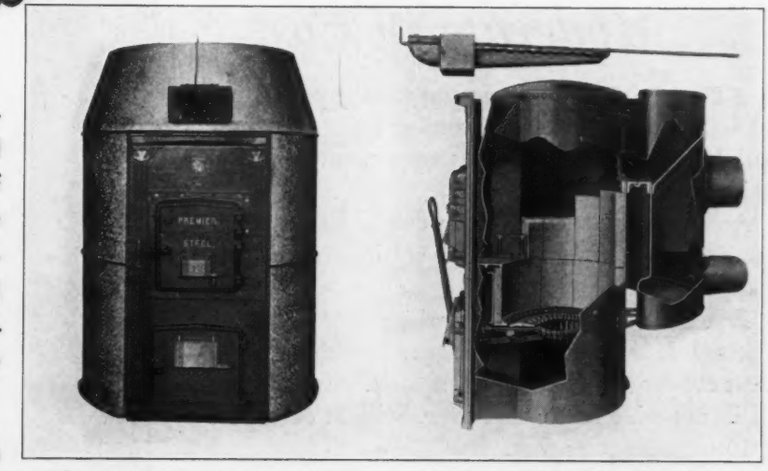
BUILT BY AMERICA'S PREMIER FURNACE BUILDERS

★ PREMIER STEEL

It's Riveted ... It's Welded ★ ★ ★

If you're out on the firing line fighting tooth and nail for every sale and are interested in developing a list of satisfied customers, and, if you want to sell a quality made, fully guaranteed and moderately priced Steel furnace — then, YOU MUST CONSIDER the new, and improved Premier Steel Furnace.

It's BRAND NEW from top to bottom and literally packed with outstanding features that will make it a best-seller —everywhere.



When cased the Steel presents an attractive, compact, and distinctly modern appearance that appeals to every prospect who desires an up to date installation.

There's powerful selling dynamite in the riveted and welded construction of the sturdy drum and radiator. Smart dealers will cash in on this feature.

GUARANTEED FOR 10 YEARS—GRATES INCLUDED

NOW you can offer your prospects greater dollar for dollar value in a steel furnace than ever before. Premier's famous 10 year guarantee is in back of every furnace you sell. This iron-clad warranty is given FREE and even protects the grates.

A few of the other saleable features include—riveted and welded construction . . . Automatic overhead humidifier as regular equipment . . . heavy duty roller bearing duplex grates . . . lock tight radiator flange . . . and modern front design in alloy iron.

You'll experience new and greater activity in steel furnace sales if you display Premier's new Steel Unit. Write today, or send coupon below, for full particulars—there's no obligation.

PREMIER Steel FURNACE

NOTE: We have discontinued the manufacture of our former steel furnace—the Duo Weld—but we will always maintain a full stock of genuine repair parts for our dealers.

PREMIER FURNACE COMPANY

Manufacturers of Warm Air Heating and Air Conditioning Equipment

DOWAGIAC MICHIGAN

MAIL THIS COUPON NOW!

PREMIER *of Dowagiac*

Gentlemen:

I'd like to know more about Premier's new, and improved Steel Furnace—send me the full particulars and prices.

NAME .....

ADDRESS .....STATE.....

CITY .....

If you want our representative to call check here——

Take advantage of the trend towards metal roofs . . . . . .

Anaconda Economy Copper Roofing

Durable . . . Beautiful . . . Moderate in Cost

METAL ROOFS are once again gaining popularity. And this new 10-oz. standing seam *copper* roof will bring you new business opportunities in the residential roofing field.

Architects are specifying Anaconda *Economy* Copper Roofing, and homeowners are interested in its many advantages.

Anaconda distributors everywhere now stock this material. It is packed flat in crates containing sufficient copper (48 sheets) for 3 squares. The strips are 16 inches wide and 6 feet long. Weight of copper is 10 oz. per square foot.

36180

Here are the reasons why homeowners will buy Anaconda Economy Copper Roofing

1 RICH APPEARANCE—beautiful at any stage of its long existence.

2 SECURE AGAINST DESTRUCTIVE FORCES OF NATURE—high winds leave this roof unscathed—flying sparks cannot harm it and, when properly grounded, it is lightning-proof. This means lower insurance rates.

3 LIGHT WEIGHT lessens the cost of roof-joists and supporting members.

4 CORRECT DESIGN which includes ample provision for expansion and contraction of the copper itself.

PLUS—YOUR CRAFTSMANSHIP—the final assurance of a satisfactory job!

What other roofing material has all these advantages?

ANACONDA
from mine to consumer

Anaconda Copper

THE AMERICAN BRASS COMPANY, General Offices: WATERBURY, CONNECTICUT

Offices and Agencies in Principal Cities . . . In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

AMERICAN ARTISAN

Volume 105 Number 10

Why Folks Buy

SOME folks buy just to follow the example of the Jones' (keeping up with the Jones') we oftentimes say. Some buy because health, service, actual needs dictate the purchase. Some buy because new apparatus does the job easier, quicker, cheaper, more conveniently.

But why do folks buy air conditioning equipment?

We are indebted for some of the statements quoted here to Don Luty of the Gar Wood Industries who called our attention to some facts recently disclosed by a national survey covering reasons why homeowners purchased air conditioning equipment.

This survey showed that almost 25 per cent of owners purchased their automatic heating equipment because it was labor saving and comfort providing. Another 20 per cent bought because modern air conditioning equipment promotes cleanliness. Eighteen per cent gave uniform temperatures throughout the house as the deciding reason.

Sixteen per cent bought because of decreased personal attention (elimination of firing, ash removal, grate shaking, etc.). Eight per cent bought because they felt modern apparatus brings better health through positive control of moisture content, elimination of dust and dirt, uniform temperatures, satisfactory heat.

Eight per cent bought because modern apparatus takes up less floor space and can be placed to make available expensive floor area. And only 7 per cent bought because new equipment costs less to run.

Those contractors selling winter or summer or year 'round air conditioning systems may profitably pause and read the order of "reason why" again. Perhaps some of our pet selling arguments may have been based upon personal experiences and so have led us to dwell too extensively on arguments which need too much talking to get across.

Perhaps, also, we have been overlooking the important influence of "cutting down the labor". And, also, we may not have given enough thought to the housewife's buying influence. She is thinking in terms of family health, elimination of cleaning, and comfort without running up and down the basement stairs.

Like the automobile, air conditioning is rapidly reaching the acceptance value where what it does is more important than "tinkering with the gadgets."

◈

Better Prices

WE said to a contractor friend the other day—"And what is 'so and so' doing now?"

Said the contractor—

"He puts a furnace vacuum cleaner and as much gutter as he can in his truck and starts out every morning. He doesn't come back all day and says 'If the 'phone rings, that's too bad.' To make matters worse he will quote on anything, any time, any place, just as he stands in his overalls and, boy, but he has been making some optimistic guesses on his own speed.

"If this dealer and about a dozen more like him in our town don't wake up to the fact that they are not making day wages, we are all going broke."

And we said—"But we thought you contractors had gotten together and perfected a city licensing and installation ordinance which compels some degree of financial responsibility, a shop and telephone, sufficient knowledge to install properly, and fees sufficient to hire a competent inspector and pay a teacher to explain good design?"

"So we did," replied the contractor, "but the drive fell through six months ago and everyone has enough work now that we can't get the members together long enough to lay plans for the final effort to secure city adoption."

From communities all over the country we hear this cry for better prices.

But there is no panacea for better prices.

Better prices can come only from—

1. A code which absolutely controls just how every job must go in.

2. Inspection which quickly catches the violater and either makes him change his ways or puts him out of business.

3. Regulations enough in the code to compel adequate engineering and owner safety even when the installer can't or won't engineer.

4. Education and more education on costs, design, labor and material quantities and costs, good and bad practice, safety.

5. Leadership and guidance from those who are making money honestly so that the "corner-cutters" sooner or later learn that their system is all wrong and that better ways mean better income.

(Copyright—Wurts Brothers, N. Y.)

Lead Protection on New York's U. S. Court House

THE use of metal to prevent building deterioration caused by moisture penetration, has undoubtedly been one of the outstanding developments of the last few years. This use of metal to prevent water penetration is exemplified in the monumental new United States Court House in Foley Square, New York City. This beautiful building, some 40 stories in height, designed by Cass Gilbert, Inc., uses hundreds of tons of metal from the foundation to the lofty roof to prevent water penetration which might cause material failure. Lead was the material selected because of its enduring quality, both in sheet form for flashing, water-proofing, and protection and in paint form for protecting the structural frame and in heavy sheet form under foundations.

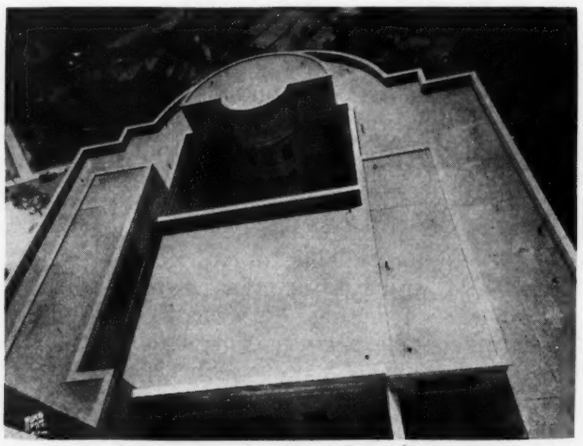
In addition to these exterior applications, lead was used as linings in shower stalls throughout the building, in water closet connections and as an underlay beneath the tile of the roof.

The sheet lead was installed by the J. J. Fisher Company, Inc., of Brooklyn, sheet metal and roofing contractor for the building.

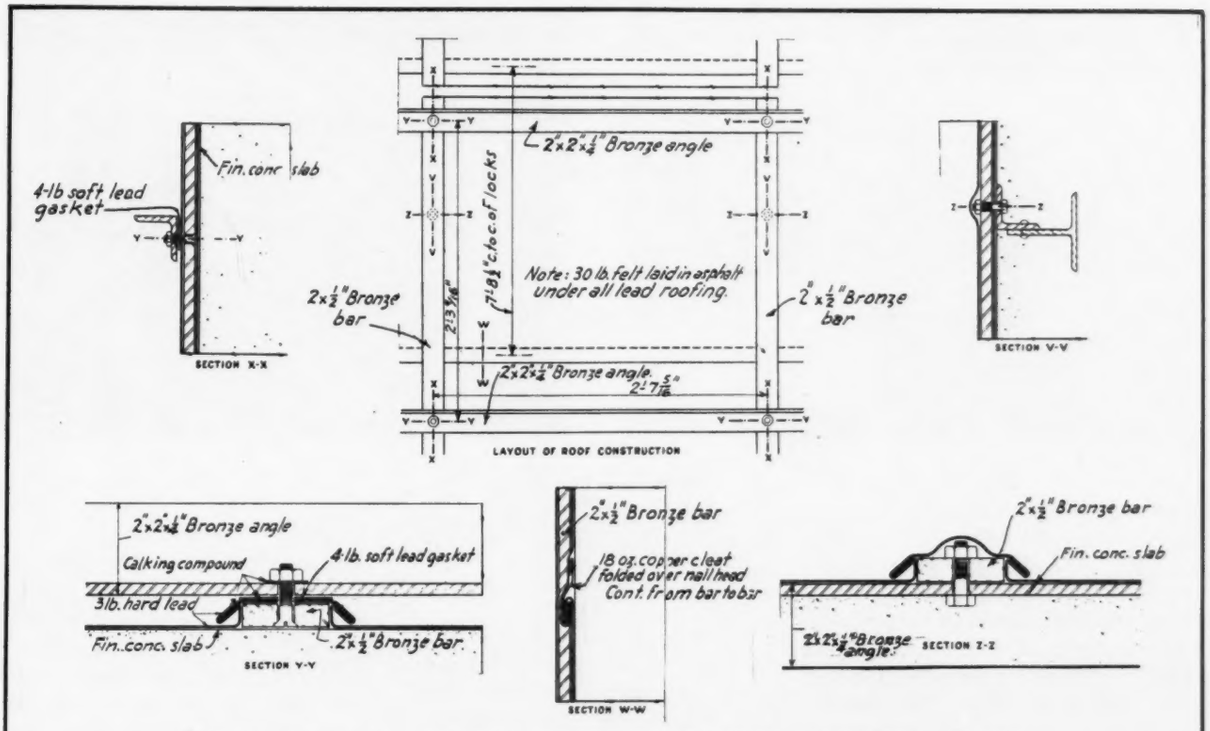
The photographs and detail drawings show many of the interesting applications of sheet lead on the building. Small roofs are completely covered with lead, while the masonry exterior has lead as wall flashing. The entire tower roof is finished with gold and blue glazed tile under which is a waterproofing of three-pound hard sheet lead.

The construction of the tower roof is said to be unique. Thin precast concrete slabs were installed on the structural steel frame work as shown on the interior view of the tower. Over

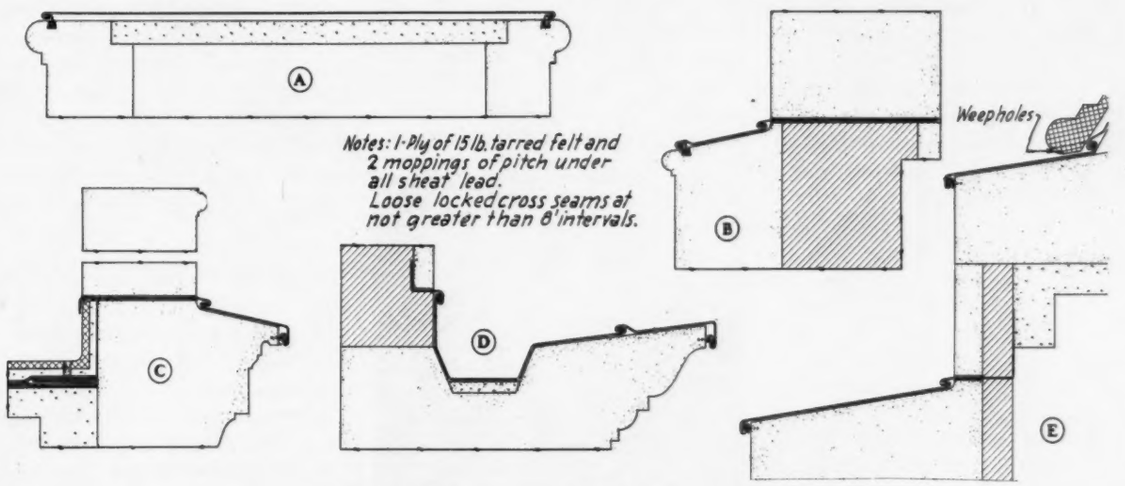
Sheet lead caulked into reglets above a masonry joint in one of the many deck copings.



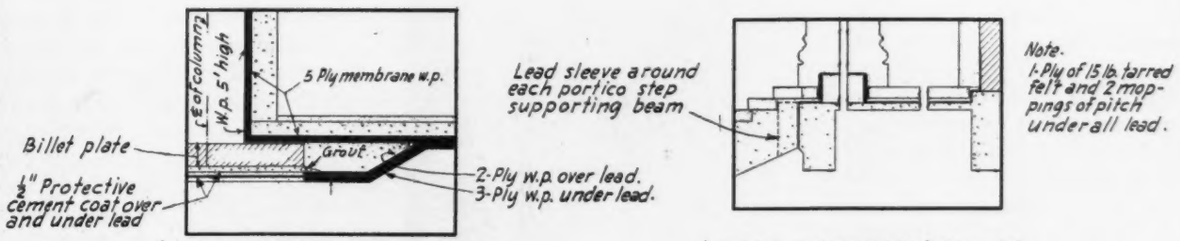
Looking down onto the walking tile covered rear set back. Many thousands of feet of lead flashing was used throughout the building.



DETAIL OF LEAD BATTEN ROOF LINING UNDER TILE TOWER ROOF

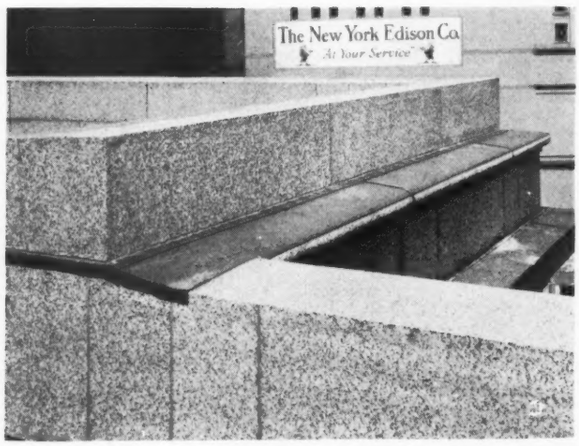


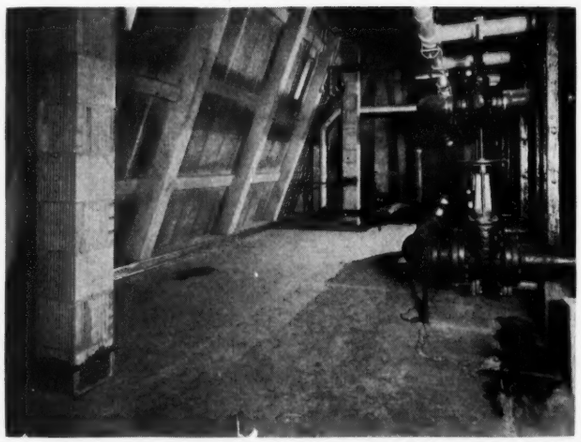
TYPICAL FLASHING DETAILS



LEAD WATERPROOFING UNDER COLUMN FOOTING

LEAD WATERPROOFING UNDER MAIN PORTICO FLOOR



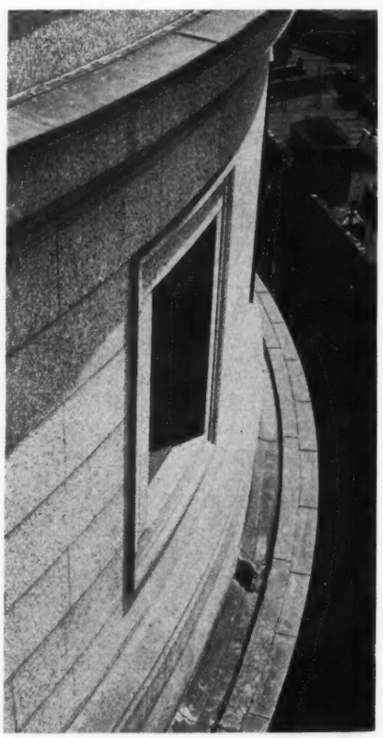


Left—Coping cap and coping flashing showing special interlocking through-wall flashing loose locked to the flashing beneath. Right—Turned up lead pan edges around columns of tower room.

these concrete slabs a layer of 30-pound felt was laid in asphalt. Bronze bars or angles measuring 2 inches wide and one-half inch high run up the slope of the roof on approximately two foot, eight inch centers. Horizontally between these bars are continuous 18-ounce copper cleats about 7 feet 8 inches apart. Lead sheets were installed with loose-lock seams at these cleats and the cleats were folded into these seams to secure the lead sheets in place. On the sides, adjoining the bronze bars, the lead sheets were turned up against the bars with sufficient excess lead edge to make a lock seam. Lead batten caps were then placed over the bars and loose-locked to the lead sheets. This construction is shown in one of the details of the roof. The detail shows that the bronze bar was fastened to the concrete slab by a bolt and the lock seam between the cap and the pan sheet was turned down and malleted tight. The application of the lead pan sheet and lead batten cap where the horizontal bronze bars overlap the up and down bronze bars is also shown in one of the details. The detail indicates that a soft-lead gasket was placed around the bolt over the batten cap with caulking compound used around the bolt to insure water tightness. The construction of the horizontal flat-lock seam with the 18-ounce copper cleat folded over the nail heads is also indicated in one of the detail sketches.

The bronze angles which are placed horizontally about 2 feet 4 inches on centers up the slope of the roof and are bolted to the bronze batten through lead batten caps support the tile roofing which is colored glazed terra cotta. A special gold glaze was developed for the gold color in order to maintain indefinitely the gold appearance with a minimum of upkeep.

It is interesting to note that special attention was paid to the problem of expansion and contraction in the underlying metal



Looking down the rear wall showing method of covering gutter and molding course with lead, loose locked sheets.

sheets. The lead sheets were installed so that each sheet can expand and contract freely in all directions, and yet the lead is firmly supported on the steeply pitched roof by the continuous copper cleats at the cross seams.

The small flat roof areas on the building were covered with flat loose-lock seams in the same way as the cornice coverings. At edges continuous lead cleats were caulked into reglets and locked to the upturned roof sheets.

One of the interesting features of the general design of the building is the numerous decks, porticos and cornices which made a large amount of flashing necessary. Hard lead sheets weighing three pounds per sq. ft. were used for practically all of this construction. In some instances, as for example the lining of the floor of one portico heavier lead was employed. All through wall flashing in the building is hard lead with a patented interlocking design. Wherever through-wall flashing extends out into the open more than a few inches or is adjacent to a cornice covering, the exposed lead flashing or cornice covering is loose-locked to the through flashing. Exposed flashing and cornice coverings were installed in not greater than 8 ft. lengths with cross seams between lengths loose locked. This construction was used in order to provide free expansion and contraction in four directions.

In a number of locations on the building, bends had to be made in the lead sheets at right angles to and crossing loose-locked seams. Since the ends of the lead

(*Continued on page 97*)

Welding Procedure for the Sheet Metal Shop

By J. Carl Wilson

A series of practical articles covering accepted welding practice for light gauge sheet and light structural shapes as used in the sheet metal shop for the fabrication of metal specialties, ventilating work, or general architectural practice. This fifth article discusses welding practices suitable for ventilating and blow pipe work. The drawing on the following page shows details.

Ventilation Work and Automatic Carbon Arc Procedure

WELDING does not have as many points of advantage for ventilation duct work fabrication as in other types of sheet metal work; nevertheless it has several points in its favor. Speed in fabricating ducts and fittings by the manual welding process will be about five to eight percent faster than the formation by Pittsburgh type seam; the government lock type seams will be about 8 per cent faster by welding. If we can adopt the automatic shield arc process, this percentage can be materially increased as will be shown later in this article.

Arc Welding Galvanized Iron

Arc welding of galvanized iron will burn the galvanizing off about ⅜ of an inch on each side of the weld. This, contrary to first observation, does not have any appreciable effect on the life of the iron as the extreme heat that the iron is brought to in welding and fast cooling forms a very hard slag or scale a few thousands of an inch thick over the area and extending under the coating. This protects the basic iron from the elements and prevents oxidization and rust from forming. On the other hand, this would be of small consequence without the protecting scale, owing to the fact that we hardly ever assemble any article that we don't have raw edges all around without any serious consequences. For appearance sake, all welds on galvanized iron should be painted with a good aluminum paint. This in itself is an excellent protection against rust.

Air Loss

Air loss is of small consequence in low pressure ventilating systems, but is worth considering as it is an excellent selling point and will amount to from 1 to 10 per cent on systems where seams are properly made; on others the loss will be considerable more; on a welded system the loss is zero. Labor on installation in most cases will be 5 to 8 per cent less and appearance is usually better.

Metal Thickness	Arc Volts	Arc Amps	Carbon Size	Autogenizer Grade	Filler Metal Lbs./Hr.	Welding Speed Ft./Hr.
No. 14	24	250	⅝	100	None	300

Estimating Cost

To estimate the cost of making welds automatically or manually with shielded carbon or metallic arc, the following items should be included in estimating cost per foot of weld:

Labor: can be obtained from known speeds (feet per hour).

Power: Volts and amperes for welding various types of joints can be estimated very closely or taken from a good hand book. From this data the amount of power can be estimated readily. The efficiency of welding sets can be conservatively estimated at 50 per cent.

Electrodes: Cost of carbon electrodes can be obtained from supplier.

Autogenizer: The cost of various types of autogenizer required per foot of weld can be obtained from the supplier.

Filler Metal: where required for certain types of joints the amounts needed per hour are tabulated.

The above items comprise all the elements of direct cost for arc welding. From the data referred to previously the cost of making any of the types welds illustrated either manual or automatic can be readily calculated.

Example: 14 Ga. butt weld, no filler metal—70% penetration.

Labor .....$0.75 per hr.
Power .....$0.02 per Kwh.
Efficiency 50%
Electrodes (carbon) .....$0.085 each
Autogenizer .....$0.50 per lb.

Cost per foot

Labor:

$$\frac{\text{Labor per hour}}{\text{Welding speed per foot}} = \frac{75}{300} = \$0.0025$$

Power:

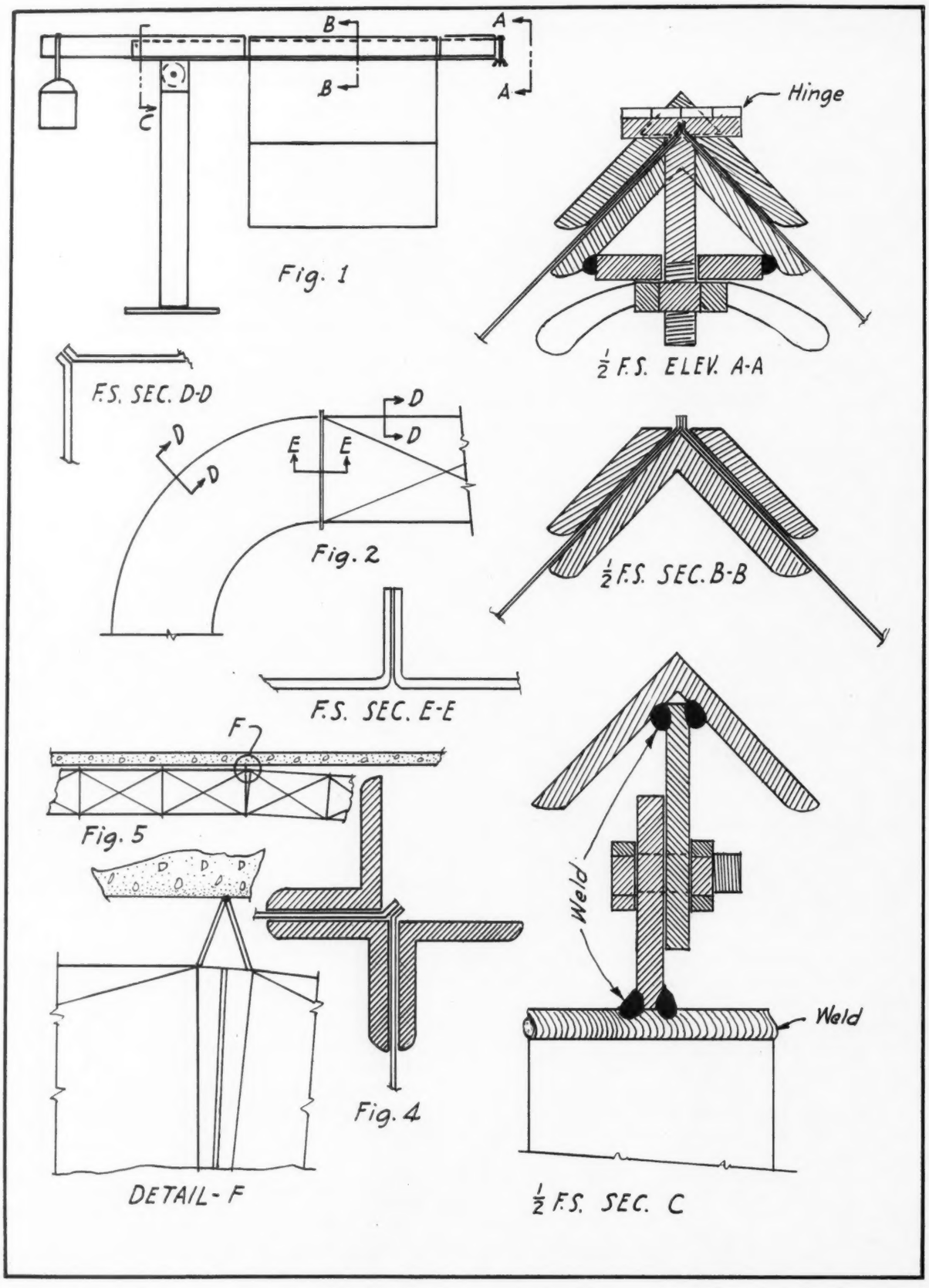
$$\frac{\text{(Volts) (Amperes) (Cost per KWH)}}{\text{(Efficiency) (Welding speed, feet per hour) (1000)}}$$

$$\frac{24 \times 250 \times 2}{.50 \times 300 \times 1000} = \$0.0008$$

Electrodes: (Carbon)

$$\frac{\text{One per hour} \times \text{Cost per piece}}{\text{Welding speed in feet per hour}}$$

$$\frac{1 \times .085}{300} = \$0.000283$$



Autogenizer:

$$\frac{\text{Cost per lb.}}{\text{Footage per lb.}} = \frac{.50}{300} = \$0.00166$$

Filler Metal: (None required)

Total cost per foot = $0.005243

It should be noted that the welding speeds tabulated for the various types of welds are actual welding speeds and do not take into account setup time, operator fatigue, handling of the work, etc. These factors are variable depending upon shop conditions, efficiency, etc.

Joints are prepared for automatic welding in the same manner as for manual welding, actual welding speeds will be approximately the same as for manual welding. However, the total welding cost will be considerable less when an automatic welding is used. In many manual welding operations approximately 50 per cent of the operator's time is consumed in actual welding, the remainder being used to change electrodes, relieve fatigue, etc. With the use of the automatic feeder the human element in the actual welding operation is practically eliminated, less concentrated physical effort is required and as a result approximately 80 percent of the operator's time is consumed in actual welding. Thus it readily can be understood that about 60 per cent more welding can be done per unit of time with the automatic feeder than by the manual process. The resultant cost per foot of weld will therefore be considerable less. Also, due to the steady feed of the automatic arc, more uniform welds can be obtained.

We plan to use some charted graphs in later articles showing relativity of currents, metal thickness, pounds of electrode per foot and welding speeds feet per hour.

The accompanying illustration and details show types of jigs for vents, ducts and square or rectangular vessels.

Fig. 1 (Details AA-BB and C) this and all the previous jigs used in these articles have been designed alike on purpose. It is better to have them all individual if space will permit; if not, they may be made to fit one pedestal with the horn and holddown removable.

Note Sec. C, hinged so jig horn may be tilted to about 20 degrees from horizontal to permit welding down the slope. Jigs for fittings are not very practical owing to the wide variation in size and shape, although Fig. 4 shows a type of jig that may be used, consisting of 3 pieces of angle iron rolled to the radius of the fittings and clamped with "C" clamps.

Sec. BB-DD shows best type of corner seams. Sec. EE shows type seams to replace government lock seams.

Fig. 5, Detail F, shows one method of installation when ducts fit close up against a floor slab. To make joint F, weld top, bottom and sides, leave only unwelded the corners at top. This will permit the duct to be pulled down allowing welding of the next section. Sections should be made as long as practical on the floor.

(Cost chart taken from procedure hand book published by Lincoln Electric, Cleveland, Ohio.)

Welded Aluminum Canoe Weighs 83 Pounds

AN oxy-acetylene operator recently designed an all aluminum canoe to be constructed by oxwelding. Although entirely without previous experience in oxwelding aluminum, the operator had witnessed demonstrations by experts, and knew the principles involved. Before beginning the actual fabrication, however, he studied carefully the procedure he meant to follow. To make sure of his technique, he practiced first on scrap pieces of aluminum using high quality aluminum flux* and welding rod** and followed the recommended procedure for oxywelding aluminum.

That his work was successfully accomplished is shown by the accompanying illustrations. The hull of the canoe consists of ten strips of aluminum extending from one gunwale to the other welded together at the seams. The hull is reinforced by several cross pieces and by suitable reinforcements at the ends and edges.

When the operator had completed his work, the result was a graceful little craft that weighed only 83 lb. Moreover, it was permanently leakproof and corrosion-proof.

The canoe is patterned after a standard size "Old Town" canoe. Its length is 17 ft., 1¼ in. The width of the beam is 33⅞ in. The weight of the air tanks under the seat, 63 lb. completed. The shell of the canoe is made of 0.04 in. thick aluminum, grade 3S and ¾ hard material. The gunwhale tubing is $1\frac{3}{16}$ in. O. D. and made of 0.049 in. 4SH aluminum. The ribs are ¼ in. wide, 0.051 in. thick and made of 4S aluminum.

*Oxweld Aluminum Flux.
**Oxweld No. 23 Aluminum Rod.

Below
The technique used in fabricating this aluminum canoe was learned at an oxwelding demonstration

Righ:
This aluminum canoe is permanently watertight and weighs only 83 lb.

The Warm Air-Fan System of Heating and Ventilating for Factory Buildings

By Platte Overton
Chief Engineer, The Furblo Co.

In this series on heating larger buildings the author will discuss the apparatus used and engineering involved. In this article he takes an open factory, figures the heat loss and outlines three heating systems.

◆

IN the September issue we prepared preliminary data for our factory system and established our c.f.m., register temperature, and are now ready to design the system.

We will first design the system shown in Fig. 1. Two designs are shown, one drawn in detail and the other indicated by the dotted lines. The single duct system will be the cheapest, but the double duct system will give better distribution of air and a more uniform temperature.

Trunk systems are designed to equal resistance per linear foot, never to areas. We will establish the overall resistance for the system and work to it. In factory work some noise is not objectionable and we may use high velocities and small high speed fans. Our job is designed to .4 of an inch of resistance; .30 for the piping system and .10 for the pressure loss over the heaters and through the casings.

Starting at the center of the heaters we draw a line where we plan to run our duct. A measure of this line gives us 252 linear feet to which we add 10 feet for the resistance of each elbow, and as we have two elbows we have a total of 272 feet. Referring to our chart for determining resistance loss in ducts, Fig. 10 we find the chart reads in ducts 100 feet in length. We have 272 and our desired pressure loss is .3 inches. To use the chart divide .3 by 272 equals .11 for the point on the chart for 272 feet. At the right-hand side of the chart on the line 8250 c.f.m. we follow to the left until we intersect with the line .11 from the base of the chart and find we have a 32-inch duct with a velocity of about 1600 feet per minute. We do not carry this duct through the same size, but will design it to 16 branch discharges of equal size and to the same pressure loss per linear foot.

In order to secure equal air delivery from each of the 16 openings it is essential that each branch have a friction equal to all other branches and to the main pipe. We size the branches to equal friction by charts shown in Figs. 12 and 13.

We use these charts in the following manner: Divide 8250 c.f.m. by 16 equals 515.6 c.f.m. for each of the 16 branches. We now space these branches along the duct as shown and size the main in the following manner. 515.6 ÷ 8250 equals 6¼ per cent of a 32-inch duct. Locate 6¼ per cent line on the left-hand edge of the chart, Fig. 12, and follow to the right until intersecting with the 32-inch diameter of main pipe, move from here to the top of the chart and we find 10½ inches. This is the size of our openings from the main.

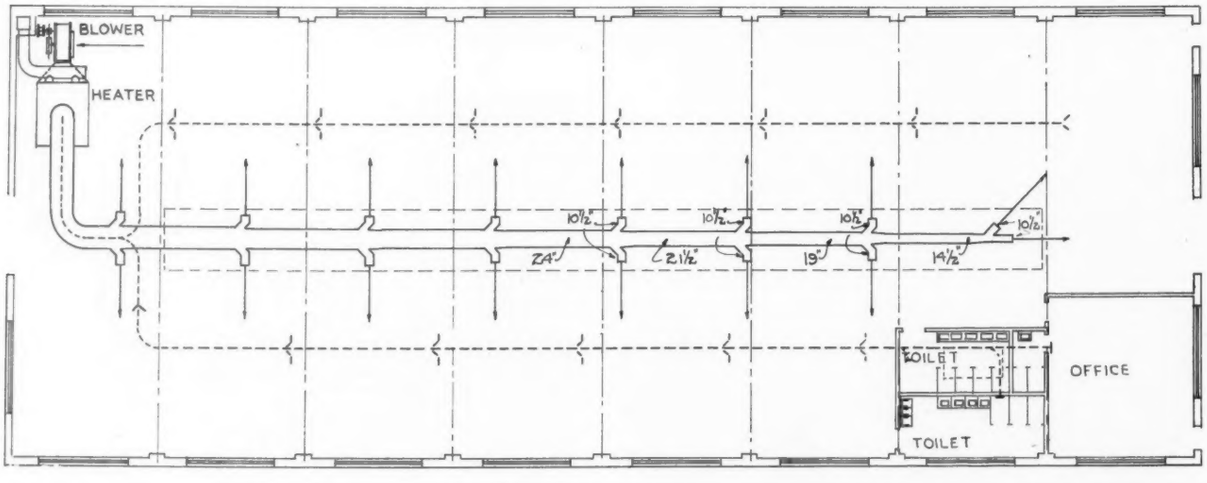


Fig. 1—Tentative plan of factory showing one-trunk and double-trunk piping systems with branches, each to deliver a proportionate volume of warm air.

To size the main, we start at the end farthest from the heater where we have two branches. Our branch size has been established as 10½ inches. We have two 10½-inch branches joined or one 10½-inch pipe is equivalent to 50% of the main at this point. Find 10½-inch pipe at the top of the chart Fig. 13 and drop down until intersecting with the 50% line from the right and we find we are on the 14½-inch diameter of the main pipe line.

At this point we have a total volume of air of 515.6 plus 515.6 equals 1031.2 c.f.m. and this is 50% or ½ of the air in the main beyond the next branches so we find 14½ at the top of the chart and drop down until we again intersect with the 50% line and we find a 19-inch diameter for main pipe to supply 4 10½-inch pipes.

Our next size has 6 branches so is 6 times 515.6 equals 3093.6 c.f.m. which is equal to 3093.6 ÷ 8250 equals 36.5% of our 32-inch main equals 21½-inch trunk for 6 branches of 10½ inches each. 8 branches equals 8 times 515.6 equals 4125 which is 50% of our total or 50% of a 32-inch main equals a 24-inch trunk line approximately.

The balance of the trunk line is sized in the same manner.

The alternate system shown in dotted lines is worked out in the same manner.

The Heater Size

On our data sheet we observe that we must heat 8250 c.f.m. approximately a 90 degree rise or from 60 to 150. (See page 98.)

If we base our heaters on grate area we must calculate the pounds of coal burned per hour and assume a combustion rate, generally from 10 to 13 pounds of coal per hour per sq. ft. of grate surface. The pounds of coal per hour is based on the formula lbs. of coal per hr. = $\frac{\text{c.f.m} \times 60 \times 0.24 \times 0.0651 \times (150-60)}{7200} = 97$ approximately. If

(*Continued on page* 98)

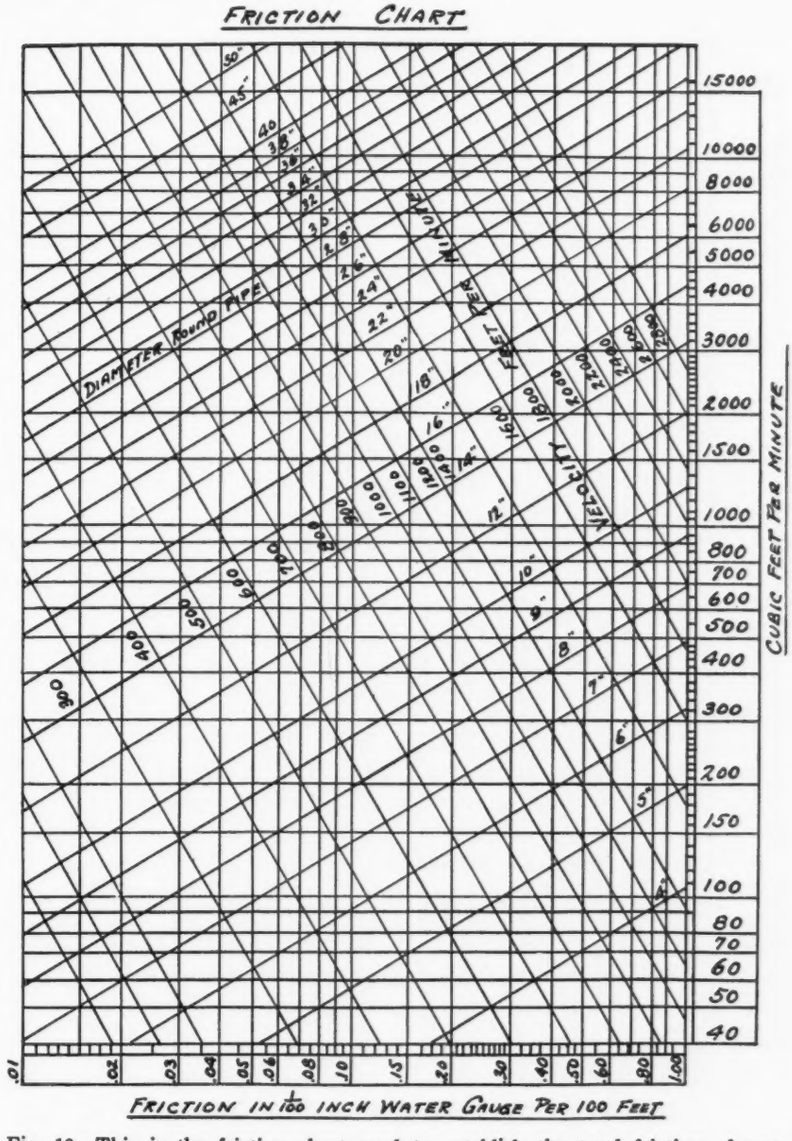


Fig. 10—This is the friction chart used to establish the total friction of any duct system and sometimes used to size the ducts.

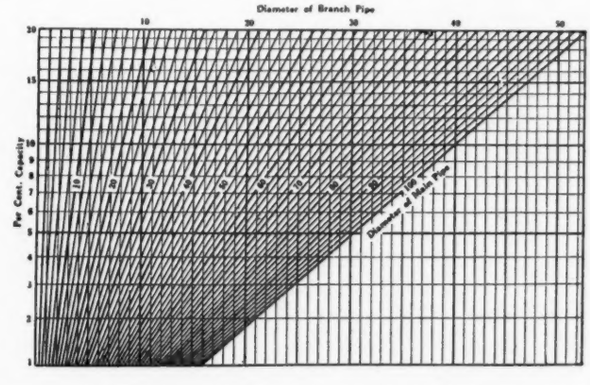


Fig. 12—Main and branch pipe for equal friction per foot of length—1 to 20 per cent by volume.

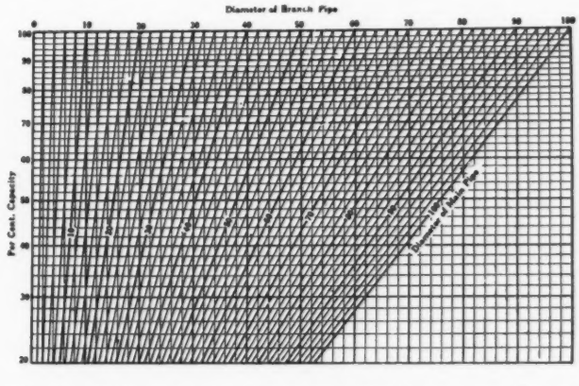


Fig. 13—Main and branch pipe for equal friction per foot of length—20 to 100 per cent by volume.

Better Weather Protection—Stucco

The recommendations presented in this series of illustrated reference sheets have been taken from various sources considered practical and authoritative. This article and the facing page of details covers several common applications of stucco where flashing must be relied upon to prevent water penetration, a serious menace to stucco.

IN the September, 1936, issue, a page of details was presented showing suggested recommendations for application of metal protective units under typical stucco applications. This article continues the discussion of better weather protection for stucco coated buildings.

It might be emphasized again that flashing application is highly essential on stucco covered buildings, due to the fact that the stucco, where it butts such structural parts of the building as door or window frames, water tables, porch roofs, dormers, or parapets, is in reality a shell hanging free of the underlying building exterior. Under certain conditions water may flow down the exterior of the stucco and return under this free hanging edge to cause structural deterioration behind the stucco overcoating. For these briefly outlined reasons, suitable applications of metal flashing sheets is the only method for preventing water passing behind the stucco shell.

The detailed drawings on the facing page show several typical applications of wall flashing for common stucco on wood framing construction.

It should be pointed out that four of the five details showing one-piece and two-piece metal flashing have one common characteristic—namely, that the cap flashing or the top bend of the one-sheet flashing is carried up behind the stucco shell some little distance in excess of the usual cap flashing. This, as stated, is a characteristic of recommended flashing practice for stucco walls. The reason for this construction is so that all water penetration is positively eliminated no matter what direction the wind may blow or how strong the rain is driven underneath the free hanging stucco shell.

Parapets

The detail in the upper left hand corner of the page shows a one-piece flashing which might be a two-piece base and cap flashing if this construction is easier to erect for a stucco covered parapet wall. As noted in the details, this parapet wall is composed of wood structural members with the stucco overcoating carried on a reinforcing mesh. The feature of interest is the furring strip used underneath the edge of the stucco shell which turns the flashing out so that the vertical face forms an even plane with the vertical outside face of the stucco shell. This construction is recommended for such applications of stucco so that water will have a tendency to flow down the stucco and continue on down the flashing rather than work its way underneath the edge of the stucco.

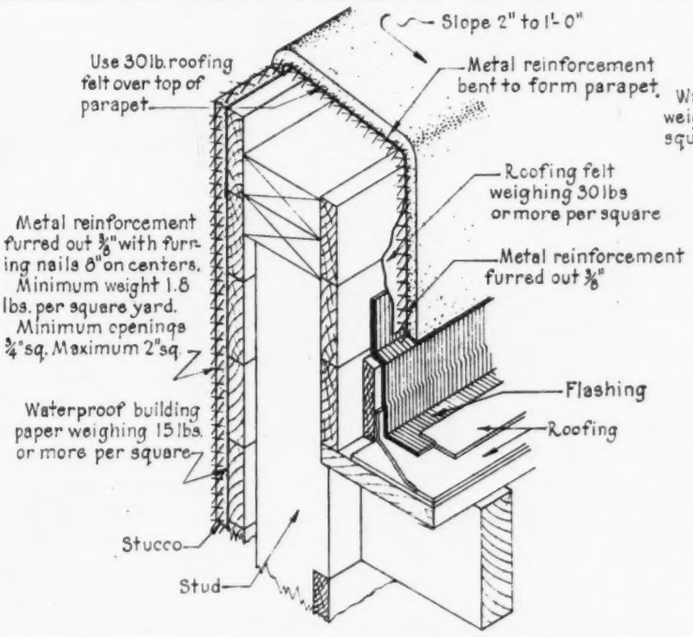
The flashing construction above the window frame and at the water table shown in the upper and lower drawings of the detail page are recommended as essential applications on stucco coated buildings. These two particular details are for old buildings on which the stucco was applied over existing siding. Flashing is so arranged that it prevents water passing up behind the stucco shell or standing beneath the edge and in most cases the lower end of the flashing is turned out to form a drip.

It is recommended that the type of flashing construction shown in the detail of the window sill be used wherever possible, although it is conceded that it might be difficult to carry the flashing through the wall as shown on an old building being stucco overcoated. In such a case, the flashing should be carried back as far as possible and caulking be used on top or beneath or both, along the edge of the sill.

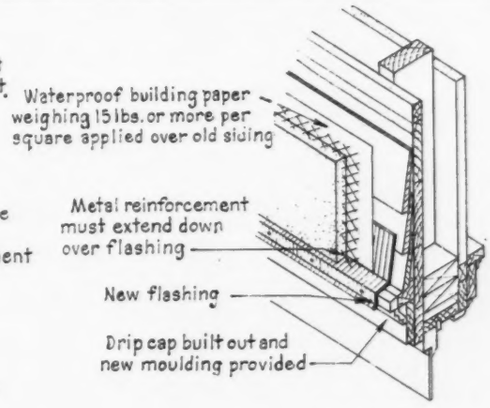
Windows

The two-piece cap end base flashing shown in the detail in the lower left corner of the drawing is recommended where it is impossible to install the one-piece flashing shown in the drawing above. It will be noted that the base flashing is carried down quite a ways over the porch roof and that the rise of the base flashing is not less than four inches. The projection of the cap flashing is a little greater than usual and this projection is recommended because it provides capillary action between the water flowing down the outside of the stucco and the water flowing across the cap flashing projection so that the water tends to be pulled down the stucco and out over the flashing, thus eliminating the tendency of the water to flow underneath and behind the stucco.

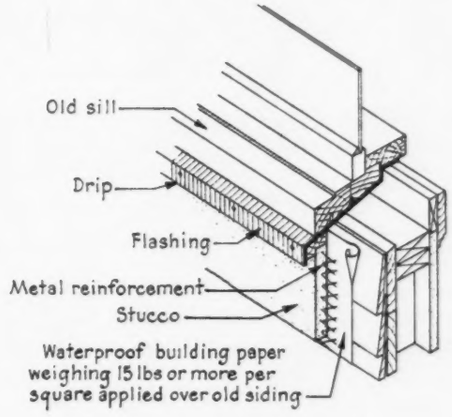
FLASHING FOR STUCCO ON WOOD FRAME



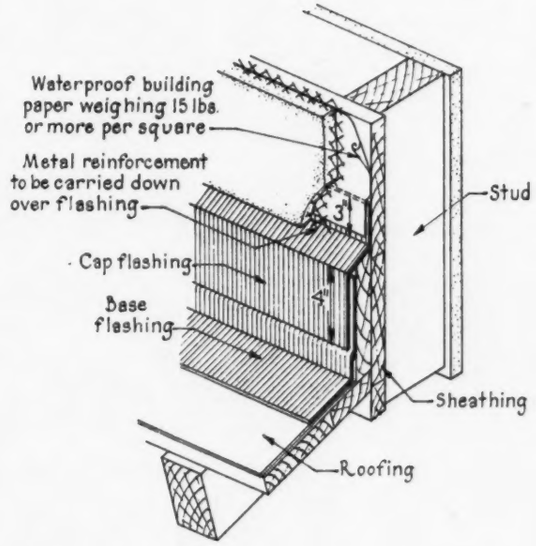
DETAILS OF FLASHING ON STUCCO COVERED PARAPET WALLS



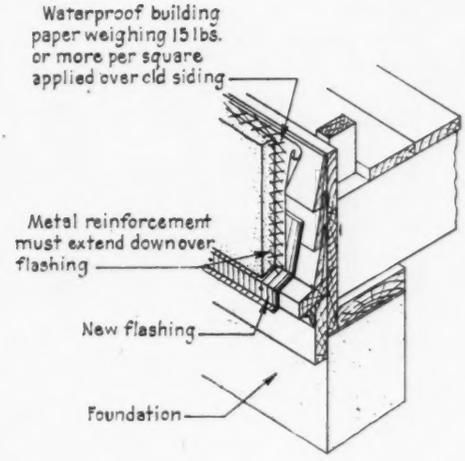
DETAIL OF WINDOW HEAD



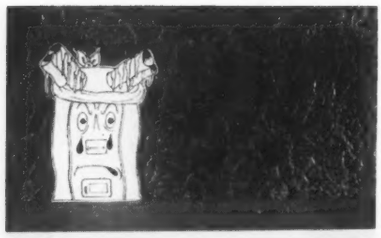
DETAIL OF WINDOW SILL

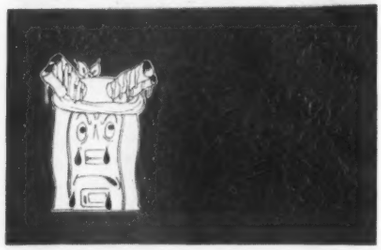


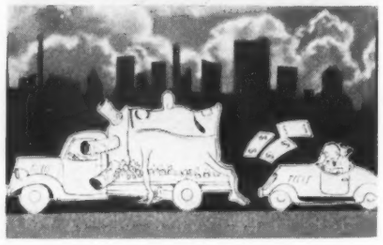
DETAIL OF FLASHING WHERE PORCH ROOF OR DORMER ABUTS A STUCCO WALL



DETAIL OF WATERTABLE







Animated Cartoon Film Sells Furnace Cleaning

A HIGHLY interesting furnace cleaning campaign was conducted by the Rybolt Heating Company of Indianapolis during the past summer. Briefly, the campaign consisted of an animated cartoon shown on the screens of all leading Indianapolis motion picture theaters during a five-week period.

How the campaign was planned and conducted is described by T. M. Rybolt as follows—

"We ran our cleaning film for two weeks in each of the prominent theaters throughout the city. The film was made up of a series of cartoons: first we showed a furnace with the front representing the face of the furnace very much downcast. The talking part of the film carried suitable explanation.

"Soot-tears dropped from the 'eyes' and the 'mouth' drooped in sadness. Then came a scene showing the furnace on a hearse with a man and woman, representing the owners, following and weeping at the furnace's demise. Slips of paper covered with '$'-signs flew from the man's pockets into the hearse. In the last scenes, cartoon workmen were seen renovating the old furnace and it visibly straightened and brightened. Crooked pipes lost their kinks, insulators were renewed, and the droopy 'mouth' turned into a happy grin.

"During those scenes the announcer commented as follows in the radio manner: 'This faithful old friend of yours worked hard for you last winter. Now he's dirty and choked with soot. He badly needs expert attention. Care for him at once or he may pass on, and with him will go many greenbacks from your treasury. Before it is too late, call the Rybolt Heating Company. Expert furnace mechanics from Rybolts will vacuum clean and repair your heating plant, efficiently and economically. Every heating plant needs cleaning and servicing immediately after the firing season. And Rybolt service is the best and most economical in Indianapolis.

Campaign Plan

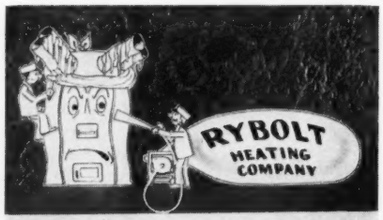
"The campaign opened on June 14th, with two of the films showing at two of Indianapolis' leading residential theatres. The films were screened at each theatre for a full week. Two films were shown each week at two different theatres over a five-week period.

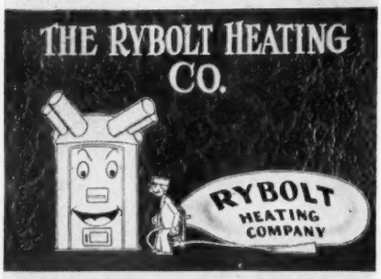
"Theatre records show that the films reached audiences totaling 52,300 persons during the Indianapolis screenings with cost-per-person contacted being estimated at less than one-half cent each.

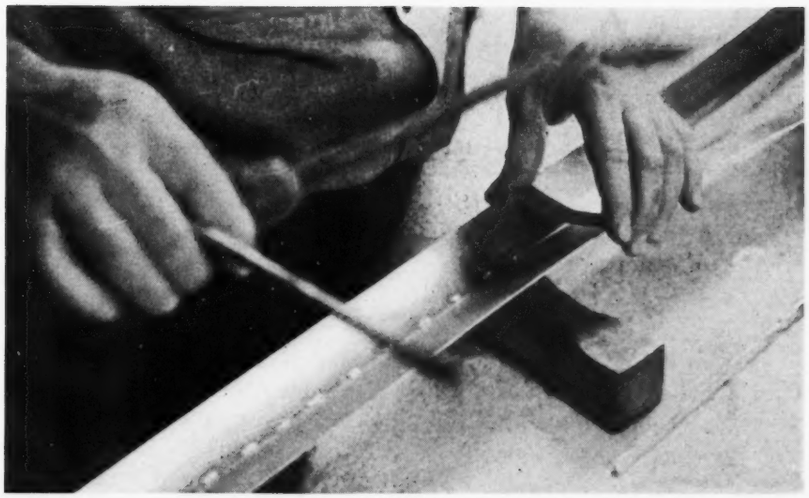
"One of our reasons for selecting the theatre as the summer "furnace cleaning and overhauling" campaign is because of the number of home-owners who attend the theatre, and because most usually the husband and wife are together.

"It appears that the originality and novelty of the cartoon presentation of the need for furnace attention also gained us considerable word-of-mouth publicity in the city. Our films were prepared around our ideas by the Alexander Film Company of Colorado Springs, Colo., which also handled all screening details.

"This film has caused a lot of favorable comments and has been mentioned on the phone when we have had calls on repair estimates. We have noted a marked increase in our repairs but whether or not this is due to the film cartoon we can not tell."







Non-locking joints can be soldered quickly by spot soldering ahead of the continuous joint soldering.

Soldering Bright Metal

IN the fabrication of items employing bright metal as the material, the contractor frequently wishes to use soldering rather than welding as a means of permanently joining metal pieces.

There are several characteristics of bright metal which should be kept in mind in all soldering operations.

First of all, bright metals possess the characteristic of exceptionally poor conductivity of heat. In other words, the metal does not heat up rapidly upon the application of the soldering iron, or the gas torch, or electric arc. As a consequence, longer application of heat is required to satisfactorily solder bright metal. It is not essential that higher temperatures are required as the same temperature used to solder galvanized iron, steel, copper, brass or tin can be used on stainless steel, but the iron must be applied for a longer period in order to permit the bright metal to heat up to a satisfactory soldering temperature.

Another characteristic to be kept in mind is that higher than usual temperatures should not be used where possible for soldering, because the co-efficient of expansion in bright metal is greater per degree of temperature increase than is the expansion of such metals as galvanized iron or steel.

The contractor, then should use the same temperature as for other soldering applications, but must be able to keep the iron in place for a longer period of time. Naturally, this means that a large size soldering iron should be used. The fact that the iron is larger than usual gives a larger area for heat transmission and an eventual saving in time is effected.

The second important characteristic of bright metals to be kept in mind is the high resistance of the material to chemical action. This means that an active chemical is required to properly react with or etch the resistant metal surface. Stronger fluxes than are used for galvanized iron, tin and other materials commonly employed in the shop must be used with the precautions that because the acid is stronger than usual care should be taken to keep the flux from spattering on clothing or hands. Extra care should also be taken to see that every trace of the flux or acid is removed at the completion of the soldering operation, because if this strong acid is left on the product, its reaction to the bright metal surface will result in surface deterioration and dulled appearance.

Use usual temperatures, a large iron and let the metal heat thoroughly are the three primary soldering suggestions.

A suggested soldering procedure would be to place the tinned pieces to be soldered in their final position, the soldering flux should be brushed on with a small brush to prevent spreading beyond the surface to be soldered. If the flux does not seem to take hold at once, rub lightly with the brush and give the acid sufficient time to react with the metal surface. Ordinarily 50-50 solder can be used from the tip of a well "tinned" soldering iron of sufficient size for the depth of the joint or the gauge of the metal. Some of the manufacturers of bright metals recommend a solder

(*Continued on page* 96)

Social Security—

Its Cost to Sheet Metal Contractors

By Joseph G. Dingle
C. P. A., Ottawa, Ill.

IN previous articles we have analyzed the several pertinent titles of this Federal Social Security Act, also the several State Acts pertaining to Unemployment Compensation. We have pointed out the tricky phases of the several so-called benefits—both Old-Age Benefits and Unemployment Compensation. We have shown that there are many "to-be-read carefully" provisions and no absolute contract for an old-age annuity; also that Unemployment Compensation may possess very little benefit to the unemployed.

We shall now take up the cost of these claimed benefits. These taxes, being based on payrolls, can best be illustrated by using actual figures. From our files we have taken actual operating figures of sheet metal shops for 1926 and 1927, which are believed to be fairly representative of the Sheet Metal Industry in normal times. In Table I we have shown four shops, with annual sales ranging from $34,393.52 to $41,008.38. We have averaged these four sets of figures, and in Table III have compiled data, showing the cost of these "Security Taxes."

Table II shows three smaller shops, with averaged figures for the three, also a shop having sales of $75,200.16. We have, in Table IV compiled cost data for the larger shop. We have not prepared a table of tax costs for the smaller shops shown in Table II for the reason that the number of employees exempts these little shops from the Unemployment Compensation Taxes, except in the District of Columbia, and the only "Security" taxes payable will be the Old-Age Benefit taxes, ranging from 1% in 1937 to 3% after 1948, and payable by both employer and employee.

Before passing on to a discussion of costs, we wish to call attention to the data shown in Tables I and II. We have shown, in dollars and percentages the Sales, Material, Direct Labor and Cost of Sales, closing with Gross Profits. Of course, there is, in the shops shown in Table I, also for the larger shop in Table II, office salaries, which are in Overhead. This discussion deals solely with the cost of these "Security" taxes on Direct Labor.

In Table III we have shown the several States which now have Unemployment Compensation Acts, showing for each State the several taxes payable, for the calendar year 1937, also for 1940. The fact that this average shop employs only six men the Federal tax for unemployment compensation does not apply in any of the states, Alabama, California, Massachusetts and Wisconsin, having an exemption identical with the Federal Act, our average shop, if in those States, would also be exempt from this tax. Old-Age Benefit taxes, on both employer and employee, apply in all States and on all employers of one or more.

By referring to Table III, it will be seen that our average shop, if in Alabama, will pay (employer and employee) in 1937, $220.24, which is 0.56% of sales or 2% of wages. In 1940 these taxes will cost $330.36, which is 0.85% of Sales, or 3% of wages.

In New Hampshire, this shop would pay, in 1937, $440.48, which is 1.14% of sales or 4% of wages. In 1940, the figures will be $770.84; 1.99% of Sales or 7% of Wages.

We now take up Table IV, covering a shop having sales of $75,200.16, with direct labor of $22,484.17. As in Table III, we show tax costs for 1937 and 1940. This shop, employing 10 em-

ACTUAL FIGURES FROM FOUR SHOPS

With Average for the Four

In Dollars:	A	B	C	D	AVERAGE
Sales	$34,393.52	$39,271.91	$40,262.70	$41,008.38	$38,734.13
Cost of Sales					
Material	16,561.81	19,141.42	14,514.93	12,688.55	15,726.68
Direct Labor	8,257.05	12,342.62	11,262.32	12,187.42	11,012.35
Total Cost of Sales	$24,818.86	$31,484.04	$25,777.25	$24,875.97	$26,739.03
Gross profit	$ 9,574.66	$ 7,787.87	$14,485.45	$16,132.41	$11,995.10
In Percentage:	%	%	%	%	%
Sales	100.00	100.00	100.00	100.00	100.00
Cost of Sales					
Material	48.15	48.74	36.05	30.94	40.60
Direct Labor	24.01	31.43	27.97	29.72	28.43
Total Cost of Sales	72.16	80.17	64.02	60.66	69.03
Gross Profit	27.84	19.83	35.98	39.34	30.97

ACTUAL FIGURES FROM SHEET METAL SHOPS

Three Small Shops, With Average for One Large Shop

In Dollars:	X	Y	Z	AVERAGE	P
Sales	$ 5,116.11	$11,956.07	$16,326.83	$11,133.00	$75,200.16
Cost of Sales					
Material	1,423.31	3,377.64	4,684.56	3,161.84	34,268.55
Direct Labor	1,100.75	3,474.82	4,662.77	3,079.44	22,484.17
Total Cost of Sales	$ 2,524.06	$ 6,852.46	$ 9,347.33	$ 6,241.28	$56,752.72
Gross Profit	$ 2,592.05	$ 5,103.61	$ 6,979.50	$ 4,891.72	$18,447.44
In Percentage:	%	%	%	%	%
Sales	100.00	100.00	100.00	100.00	100.00
Cost of Sales					
Material	27.82	28.25	28.69	28.40	45.57
Direct Labor	21.52	29.06	28.56	27.66	29.90
Total Cost of Sales	49.34	57.31	57.25	56.06	75.47
Gross Profit	50.66	42.69	42.75	43.94	24.53

TABLE III

Statement Showing Taxes for Shop Having Sales of $38,734.10 and Direct Labor of $11,012.35 — 6 Employees

1937	No. Employees	Unemployment Compensation Taxes: State Employer	Federal Employer	State Employee	Old-Age Benefit Taxes: Federal Employer	Federal Employee	Total Taxes	Percentage to Sales	Percentage to Payroll
FEDERAL.....	8 or more	(See Column Headings)							
STATES									
Alabama	8 or more	None	None	None	$110.12	$110.12	$220.24	0.56%	2.00%
California	8 or more	None	None	None	110.12	110.12	220.24	0.56	2.00
District of Columbia.	1 or more	$220.24	None	None	110.12	110.12	440.48	1.14	4.00
Massachusetts	8 or more	None	None	None	110.12	110.12	220.24	0.56	2.00
New Hampshire.....	4 or more	220.24	None	110.12	110.12	110.12	550.60	1.42	5.00
New York	4 or more	220.24	None	None	110.12	110.12	440.48	1.14	4.00
Oregon	4 or more	198.22	None	None	110.12	110.12	418.46	1.08	3.80
Utah	4 or more	330.36	None	None	110.12	110.12	550.60	1.42	5.00
Washington	4 or more	330.36	None	110.12	110.12	110.12	660.72	1.71	6.00
Wisconsin	8 or more	None	None	None	110.12	110.12	220.24	0.56	2.00
States without Acts*..		None	None	None	110.12	110.12	220.24	0.56	2.00
1940									
FEDERAL.....	8 or more	(See Column Headings)							
STATES:									
Alabama	8 or more	None	None	None	165.18	165.18	330.36	0.85	3.00
California	8 or more	None	None	None	165.18	165.18	330.36	0.85	3.00
District of Columbia.	1 or more	$330.36	None	None	165.18	165.18	660.72	1.70	6.00
Massachusetts	8 or more	None	None	None	165.18	165.18	330.36	0.85	3.00
New Hampshire	4 or more	330.36	None	110.12	165.18	165.18	770.84	1.99	7.00
New York	4 or more	330.36	None	None	165.18	165.18	660.72	1.70	6.00
Oregon	4 or more	297.32	None	None	165.18	165.18	627.68	1.62	5.70
Utah	4 or more	330.36	None	None	165.18	165.18	660.72	1.70	6.00
Washington	4 or more	330.36	None	110.12	165.18	165.18	770.84	1.99	7.00
Wisconsin	8 or more	None	None	None	165.18	165.18	330.36	0.85	3.00
States without Acts*..		None	None	None	165.18	165.18	330.36	0.85	3.00

*Notwithstanding the fact Employers pay the Federal tax, there will be no Unemployment Compensation benefits in States having no Unemployment Compensation Acts approved by the Federal Social Security Board.

TABLE IV

Statement Showing Taxes for Shop Having Sales of $75,200.16 and Direct Labor of $22,484.17—10 Employees

In States Now Having Unemployment Compensation Acts

1937	No. Employees	Unemployment Compensation Taxes: State Employer	Federal Employer	State Employee	Old-Age Benefit Taxes: Employer	Employees	Total Taxes	Percentage to Sales	Percentage to Payroll
FEDERAL.....	8 or more	(See Column Headings)							
STATES:									
Alabama	8 or more	$404.72	$ 44.96	$224.84	$224.84	$224.84	$1,124.20	1.50%	4.99%
California	8 or more	404.72	44.96	202.36	224.84	224.84	1,101.72	1.47	4.89
District of Columbia..	1 or more	449.68	44.96	None	224.84	224.84	944.32	1.26	4.20
Massachusetts	8 or more	449.68	44.96	224.84	224.84	224.84	1,169.15	1.55	5.20
New Hampshire.....	4 or more	449.68	44.96	224.84	224.84	224.84	1,169.15	1.55	5.20
New York	4 or more	449.68	44.96	None	224.84	224.84	944.32	1.26	4.20
Oregon	4 or more	404.72	44.96	None	224.84	224.84	899.36	1.20	4.00
Utah	4 or more	674.62	44.96	None	224.84	224.84	1,169.26	1.55	5.20
Washington	4 or more	674.62	44.96	224.84	224.84	224.84	1,394.10	1.85	6.20
Wisconsin	8 or more	607.15	44.96	None	224.84	224.84	1,101.79	1.47	4.89
States without Acts*..		None	449.68	None	224.84	224.84	899.36	1.20	4.00
1940									
FEDERAL									
STATES:									
Alabama	8 or more	607.15	67.46	224.84	337.26	337.26	1,573.97	2.09	7.00
California	8 or more	607.15	67.46	224.84	337.26	337.26	1,573.97	2.09	7.00
District of Columbia..	1 or more	674.52	67.46	None	337.26	337.26	1,416.50	1.88	6.30
Massachusetts	8 or more	674.52	67.46	337.26	337.26	337.26	1,753.76	2.33	7.80
New Hampshire.....	4 or more	674.52	67.46	224.84	337.26	337.26	1,641.34	2.18	7.30
New York	4 or more	674.52	67.46	None	337.26	337.26	1,416.50	1.88	6.30
Oregon	4 or more	607.15	67.46	None	337.26	337.26	1,349.13	1.79	6.00
Utah	4 or more	674.52	67.46	None	337.26	337.26	1,416.50	1.88	6.30
Washington	4 or more	674.52	67.46	224.84	337.26	337.26	1,641.34	2.18	7.30
Wisconsin	8 or more	607.15	67.46	None	337.26	337.26	1,349.13	1.79	6.00
States without Acts*..		None	674.52	None	337.26	337.26	1,349.04		

*Notwithstanding the fact Employers pay the Federal tax, there will be no Unemployment Compensation benefits in States having no Unemployment Compensation Acts approved by the Federal Social Security Board.

ployees, comes within the scope of the Federal Act, also each of the several States. These taxes, including those paid by the employees, which are really charges against the industry as are those paid by the employer, show some variations. In relation to States, they vary from a low in Oregon of 1.20% to a high of 1.85% in Washington, an adjoining State, a range of 0.65% in Sales Cost. In other words this shop in Oregon, on a sale of $100.00 would have a "Security" tax of $1.20 while across the border in Washington the "Security" tax would be $1.85 on the same sale. This is for 1937. In 1940, when the Unemployment Compensation taxes have reached their now apparent maximum, and the Old-Age (Federal) tax has been advanced from 1% to 1½%, we find Oregon still the low State, with a cost of $1.79 per $100.00 sale, with Wisconsin also at that figure. Washington and New Hampshire both have $2.18, or 39c higher than Oregon and Wisconsin, and Massachusetts has a cost of $2.33.

Turning now to the percentage these taxes bear to direct labor we find, for 1937, the range varying from 4.00% in Oregon to 6.20% in Washington, or 2.20% difference in adjoining states. In 1940 Oregon shows 6.00%, Washington 7.30% and Massachusetts 7.80%.

These percentages, as shown in Tables III and IV are based on present Acts. The best authorities (outside the Government service) agree that these rates will not produce sufficient revenue to meet the promised benefits. A recent statement, issued by the Federal Social Security Board, presumably the last word on the subject of "Social Security" was to the effect that IF every State in the Union had, in 1922, enacted legislation similar to that now in effect in the States which have Unemployment Compensation Acts, there would have been collected in taxes during the years 1922 to 1929 the sum of $10,000,000,000.00 (yes, TEN BILLION DOLLARS) and of this, **there would have been paid out as Unemployment Compensation the sum of $8,000,000,000.00,** leaving a net reserve in the fund at the beginning of the depression of $2,000,000,000.00.

It really does not require a college degree to figure that if, in the years 1922 to 1929, eight years of boom prosperity, when employment, also wages, were at the highest point in many years, with an average yield of $1,250,000,000.00 per year and a cost for Unemployment Compensation of $1,000,000,000.00 per year, that $2,000,000,000.00 reserve would have disappeared before the close of 1930. Pay rolls, on which the taxes are based, would not have yielded any such amounts as prevailed in the boom years, and, on the other side, if, in the boom years, it cost $1,000,000,000.00 per year for Unemployment Compensation it certainly would have cost several billion dollars more for 1930 and subsequent years.

For these benefits, under present rates, the Sheet Metal Industry will pay from $6.00 to $7.80 per $100.00 wages in 1940. If the rates are increased sufficiently to pay what is now promised, this figure will probably be $15.00 per $100.00 pay roll.

The Mechanic Shortage

American Artisan:

I have read your editorial on the shortage of mechanics in the September issue.

There are many things that have brought about this shortage of mechanics. One of them is the reluctance of high grade young men to enter into an apprenticeship contract, for in most trades the apprentice is the "flunky." Competition is so keen that the workmen and boss are required to work at such a high rate under strained conditions in order to make a profit on the job that they have little time to devote to the "kid." In your field there are so few apprentices in any one community, except the larger cities that no school can afford to set aside space and instructional facilities to offer full time instruction.

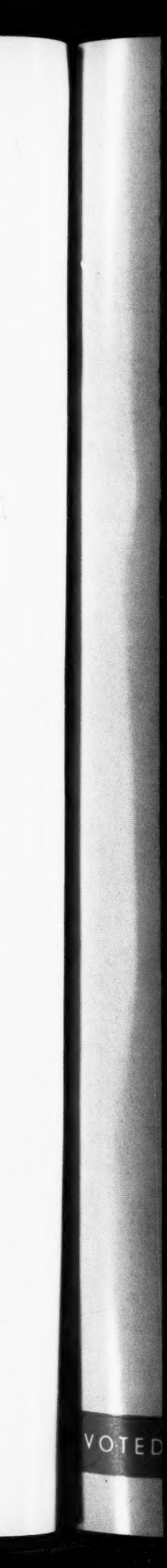
As I see it, the medium size city can only hope to supplement the training of the apprentice on the job with evening school instruction. But, unless the whole program is supervised by someone with authority to insure that the apprentice is given an all-around experience in the shop and a very thorough training in school, any program of this kind will break down just as the apprenticeship system in this country has for the last fifty years.

In this country we have all types and forms of vocational training institutions and systems. What we need is a uniform national system of vocational training such as they have had in foreign countries for years, which, by the way, accounts for the respect that is usually paid to the foreign workmen, especially those from Germany. We have that uniformity in our system of general education and should be able to organize special education in a like manner. My own private opinion is that since there are not enough workmen in most trades in the vast majority of communities to warrant a very elaborate vocational training setup, the county trade school system or even the state trade school system is the solution to the problem.

It would pay America to take highly selected high school graduates and put them through large trade schools at no expense to the student. This system, however, would break down unless all politics relative to selection were eliminated. Students would have to be selected entirely on their intelligence, character, and mechanical ability.

We teach several trades in our school, but the sheet metal trade is not taught because there are not enough opportunities in a community of this size for placement.

D. W. CASTLE,
Vocational Director,
Joliet Township High School
and Junior College, Joliet, Ill.


VOTED

EVO

RESIDENTIAL AIR CONDITIONING SECTION

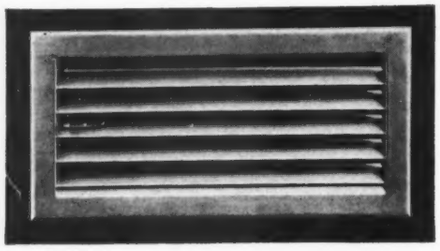
IN the September issue we published the first of a three-part series on Pressure Losses in Rectangular Elbows. The second article appears in this issue. Engineers and contractors anxious to eliminate the uncertainties imposed by elbows will find new and useful data in these articles.

- - - There appears, also, the first of two articles by Professor Rowley on the characteristics of filters. Much has been written and much sad experience has been chalked up against filters. Tests which may be used as the basis for filter selection are explained in these articles.

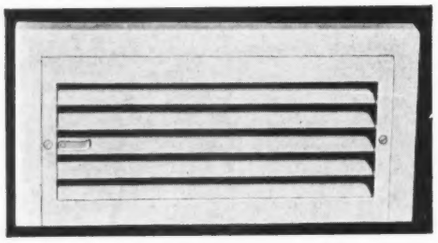
- - - And so into another heating season. Prospects for a busy winter were never better. Shops large and small are booked full of inspections, surveys, plan preparation and actual installation. The public has taken us at our word and is asking for this winter air conditioning. Let's hope everyone will make money.

WATERLOO

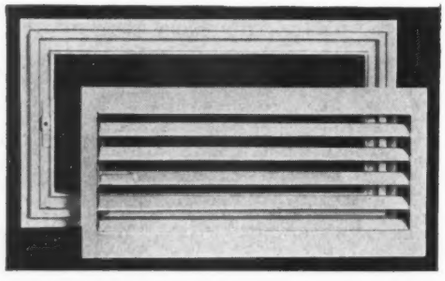
Air Conditioning REGISTERS



FH-100—Adjustable one-piece Venetian Type Register for walls.



FHD-204—Two-piece Venetian type adjustable register for baseboards.



FH-102—Venetian Type adjustable register for walls, with Vee-U plaster frame.

The Waterloo Vee-U Frame assures positive, tight connection with stack-head.

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MODERN SMARTNESS is in-built in these "venetian blind effect" registers with their unique straight-line simplicity so in vogue today. This advanced styling plus exclusive structural superiorities have made Waterloo a "sales natural" for aggressive heating men. Only Waterloo dealers can offer such sparkling, original register beauty, and such important mechanical features as—

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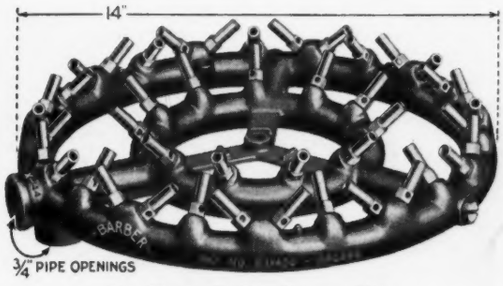
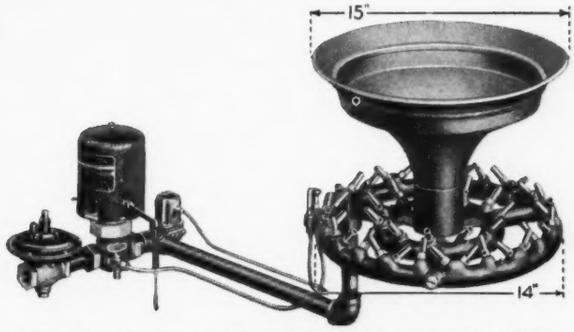
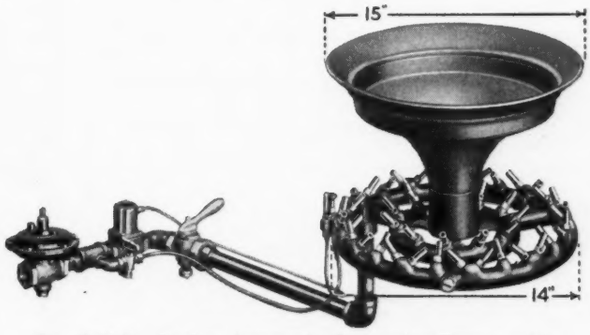


No. X-44. Barber Burner Unit



No. X-44-M. Barber Manual Control Burner with Baltimore Safety Pilot Control

With Semi-steel Flame Deflector and Ring; Motor Gas Valve; Plain Room Thermostat; Baltimore Automatic Shut-off; Pilot Light; Butterfly Draft Door Assembly; Lower Baffles; Gas Pressure Regulator; Shut-off Valve, and 25 feet insulated wiring.



No. X-44-B. Barber Automatic Conversion Burner with Baltimore Safety Pilot Control

With Semi-steel Flame Deflector and Ring; Baltimore Shut-off; Pilot Light; Lower Baffles; Gas Pressure Regulator, and A. C. A. Shut-off Valve with Union.

BARBER Conversion Burners, now as always, lead the field. As further evidence of this, Barber now presents NEW and greatly improved designs for *round* furnaces and boilers, with firepots up to and including 20 inches in diameter.

We say without exaggeration that NO other Gas Conversion Burner can be *properly* installed in *less time* than these new Barber Burners. The reason is the *exclusive* construction features, found in no other burner.

These new assemblies can be supplied for completely automatic operation with Motor Gas Valve, or Magnetic Valve—or for Manual Control. Heat is deflected to side-walls by a Semi-steel Deflector and Deflector Ring —a flame-scrubbing action that means high efficiency and economy. No refractory elements to replace.

Here, at last, is a *moderate* priced burner which has genuine merits not often found even in *higher-priced* competitive equipment.

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Examine these new burners! Write at once for Illustrative Descriptive Bulletin and Price List.

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Trane offers you an opportunity to become an established Air Conditioning Dealer.

Spencer Cooling & Air Conditioning Co., Minneapolis, Minnesota Installers of Trane Equipment in the Gilbert Cafe

Here is a chance to build up your organization. A chance to make more profit. Trane is opening the field of Air Conditioning to the Sheet Metal Trade.

You can sell Trane Year Round Air Conditioning Systems. Systems that give control of winter air conditions as well as summer. An all season profit line.

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This great new Air Conditioning industry needs the Sheet Metal man. And Trane is ready to help you be the Air Conditioning authority in your territory. Your reputation as an Air Conditioning man will boost your heating business too.

As a Sheet Metal man, you are all set. From your heating experience, you understand the distribution of air. You have all the tools. No equipment to buy. No expenditure to make.

The Trane Company will work with you. Help in your sales. Help you select the correct equipment from the most complete line of Air Conditioners on the market. You have the chance to add the profits from material to your labor charges.

There is a big demand for Air Conditioning. Not only in summer, but the year round. It is fast becoming a downright necessity. Yet, it is still a young industry. All agree it will soon be the granddaddy of them all. Your foresight in getting into this field with Trane will pay plump dividends.

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Mr. R. R. Gilbert, Mgr. Gilbert's Cafe

Gilbert's Cafe (below) Minneapolis, Minnesota

You Can Have Satisfied Customers Like Mr. Gilbert

The Gilbert Cafe, located across the street from Minneapolis' luxurious Minnesota Theatre, uses large Trane Water Cooling Coils to cool and dehumidify the air that is gently distributed throughout the Cafe. Fifty-two degree water is obtained from an artesian well located in a neighboring plant. This is used as an inexpensive cooling medium that eliminates service calls.

Mr. Gilbert, Manager of the Cafe, says he's for Trane Air Conditioning all the way. He claims his business has increased at least thirty-three per cent since the system has been in operation. Mr. Gilbert points to the fact that everything has functioned perfectly since the day the system was first put into operation.

To quote Mr. Gilbert: "We had some extremely hot weather during the middle of the summer, but were able to give our customers a cool, comfortable place for them to enjoy their meals. Their appreciation was shown by the increased number of customers and the larger size meal checks."

Satisfied customers like Mr. Gilbert are typical of Trane Air Conditioning users everywhere. Keep your customers satisfied by giving them Trane proved Air Conditioning Equipment.

The Trane Company

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Over 60 U.S. Branches

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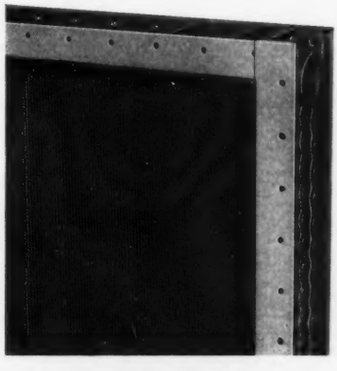
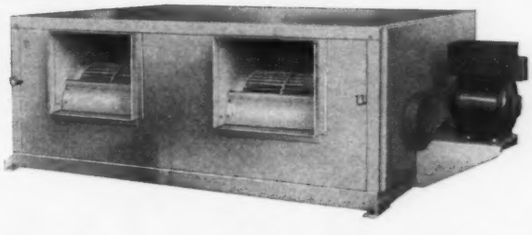


THE TRANE CLIMATE CHANGER FOR YEAR ROUND AIR CONDITIONING

Available in a variety of sizes for installation in residences, stores, apartments and many other types of buildings. Trane manufactures a complete line of heating, ventilating and air conditioning equipment to meet every modern requirement.



The Trane Climate Changer

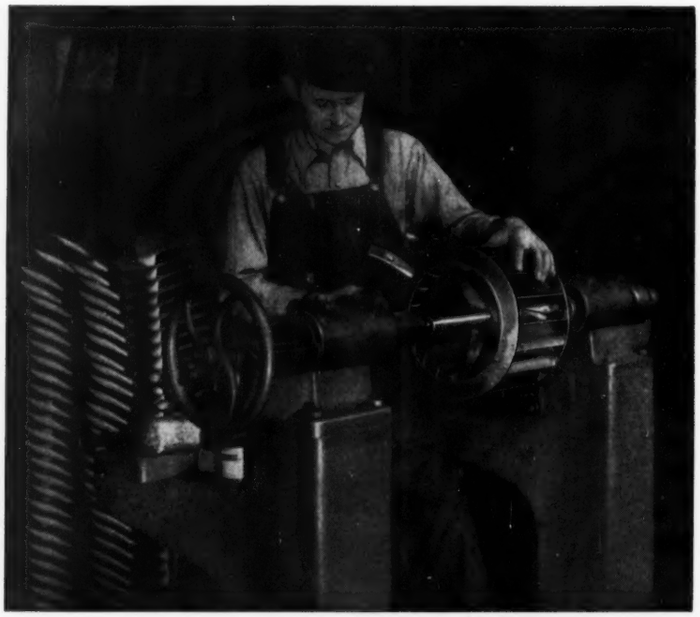
TRANE for *year round* Air Conditioning TRANE

HEATING SPECIALTIES • UNIT HEATERS • COPPER CONVECTORS • BLAST COILS • AIR CONDITIONERS

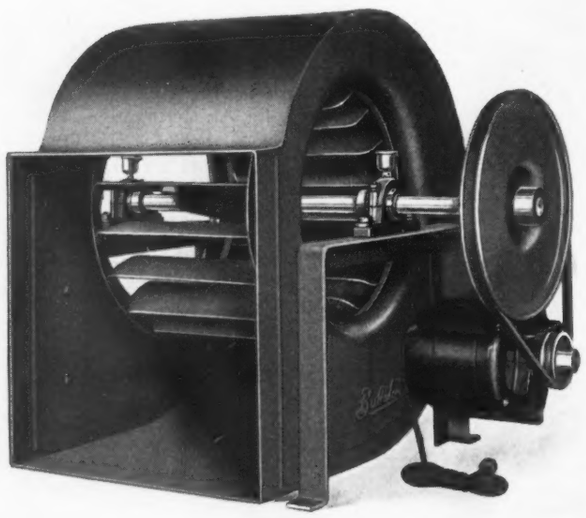
Correct design *plus* careful construction means QUIET, EFFICIENT Operation—

When you consider that the efficiency of a fan depends greatly on its design, it is easy to understand why experience is important in fan design. With more than fifty years of fan manufacturing behind us, we are able to produce fan equipment that gives the most satisfactory results.

In the actual construction of Buffalo H.V.A. Fans, we employ the same rigid standards to which our larger fans are built. Proper location of weight, correct proportioning and curvature of blades and perfect balance are all highly important. Because you can buy Buffalo H.V.A. Fans for domestic air conditioning service, for forced circulation in warm air heating jobs, and for any similar service—you are assured that these jobs will operate QUIETLY, and fans will deliver full rated capacities.



Balancing "H. V. A." wheels costs money—but it assures you of smooth-running, quiet fan.



Buffalo "H. V. A." Forced Circulating Unit. A recent addition to the Buffalo line.

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"Buffalo" Type "HVA" Fans for Air Conditioning

Forced Air Heating Facts From the Research Residence

By S. Konzo
Special Research Associate
Engineering Experiment Station
University of Illinois

Design of Forced-Air Heating Systems (Part 5)

IN the September issue a discussion of heat loss through ducts was outlined and locations where and conditions under which losses occur were specified. Also mathematical equations for determining the magnitude of such losses were presented and worked out with typical examples.

This article, which logically follows, presents results of tests on different duct materials and in tabular form the effects of various insulating materials.

Insulating Values of Various Insulations

Various forms of insulating materials are available for covering warm air ducts. The values listed in Table I were presented in Bulletin 120 and 266 of the Illinois Engineering Experiment Station and have been rearranged by the writer. The tests for the heat emission from various surfaces were made with the type of plant shown in Fig. 3. In every case, cross radiation between cylinders was eliminated by means of a vertical insulating barrier placed in the center of the intervening space. The cylinders were all 10 in. in diameter and 20 in. in length.

Saturated steam, free from entrained moisture, was supplied to the cylinders at a pressure of about 1½ in. of mercury, or 215 deg. F. The air surrounding the cylinders was at approximately 75 deg. F. Since all tests could not be run simultaneously, the bright tin cylinder was always included among the ones tested at the same time, thus serving as a control to indicate whether slight variations in external conditions were being reflected in the performance of the cylinders under test. The condensate was discharged through a short piece of rubber tubing submerged in the bucket of water. Enough cold water was placed in each bucket before the test started to prevent heating and loss by evaporation.

Values of the coefficients of emissivity, K, are given in the table. To use these data for the determination of the approximate heat loss from a pipe, it is necessary to multiply the value of K for the surface in question by the surface area of the pipe exposed, and then multiply by the difference between the temperature of the *surface* of the pipe, t_1, and that of the air outside the pipe, t_a, or

B.t.u. loss per hour $= K \times$ area in sq. ft. $\times (t_1 - t_a)$. (1)

In every case, the emissivity coefficient, K, was based on the temperature difference between the metal of the drum and the air. Since no measurable drop in temperature occurred through the metal, the metal temperature was regarded the same as that for the steam.

The efficiency as an insulator compared with bright tin was calculated from the equation:

$$E = \frac{100\ K_t}{K_s} \qquad (2)$$

In which E = efficiency compared with bright tin, %.
K_t = emissivity coefficient for bright tin.
K_s = emissivity coefficient for the surface.

It should be noted that the actual values of the emissivity coefficient, K, will probably be different from those which would be obtained if warm air instead of steam was passed through the test drums. The temperature variation across a duct carrying air is quite large, and hence the surface temperature of the duct will not be at the same value as the temperature of the main stream. The emissivity coefficient, K, based on the temperature difference between the metal of the drum and air, will not be strictly applicable to conditions where only the temperature difference between the air inside of the duct and the outside air is known. However, the efficiency values listed in Table I are comparable and may be used for determining the relative insulating values of various forms of duct insulation.

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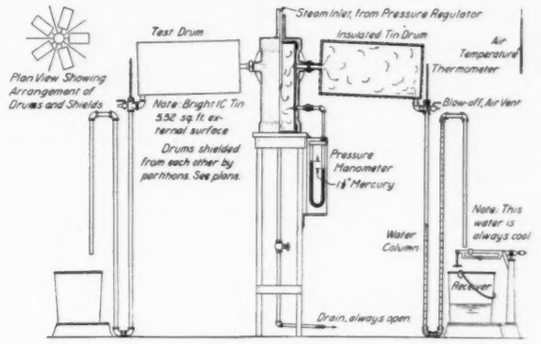


Fig. 3—University of Illinois Research Laboratory testing plant for heat emission from surfaces.

Pressure Losses In Rectangular Elbows* [Part 2]

By R. D. Madison[1]
and J. R. Parker[2]

The authors present data on pressure losses in rectangular elbows as affected by (a) the radius ratios of the elbows, (b) the aspect ratios of the elbows, (c) angle of the bend, (d) the elbow size, (e) velocity of flow, (f) splitters in the elbows, and (g) compound elbows. In general, data are given (1) for the elbow situated in a duct system with ducts preceding and following the elbow, and (2) the elbow at the end of a duct and discharging freely into the air.

Effect of Aspect Ratio

ELBOWS of various aspect ratios are shown in Fig. 6. The effect of aspect ratio for elbows of different radius ratios is shown in Fig. 7. Curves in Fig. 7 are also plotted on the basis of curve ratio to show the effect of duct friction in the region of high curve ratios. It will be seen that there is a characteristic rise in the points in this region to meet the friction curve.

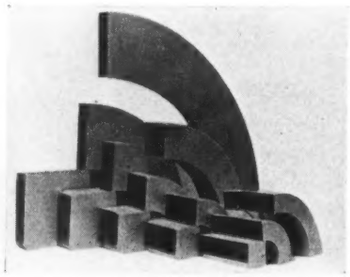


Fig. 6. Elbows of Various Aspect Ratios.

It is conceivable that if the friction curve *D*, Fig. 7, is subtracted from the total-pressure curve *A* there will result a curve which, to some extent, represents shock loss. By using this as a base curve and cross-plotting shock-loss differences with other aspect ratios, the values thus obtained can be united with their respective friction curves to obtain the most probable shape of the curves passing through actual test points. This

[1]Research Engineer, Buffalo Forge Company. Mem. A.S.M.E.
[2]Engineer, Buffalo Pumps, Inc.
*Contributed by the Aeronautic Division and presented at the Annual Meeting of The American Society of Mechanical Engineers held in New York, N. Y., December 2 to 6, 1935.

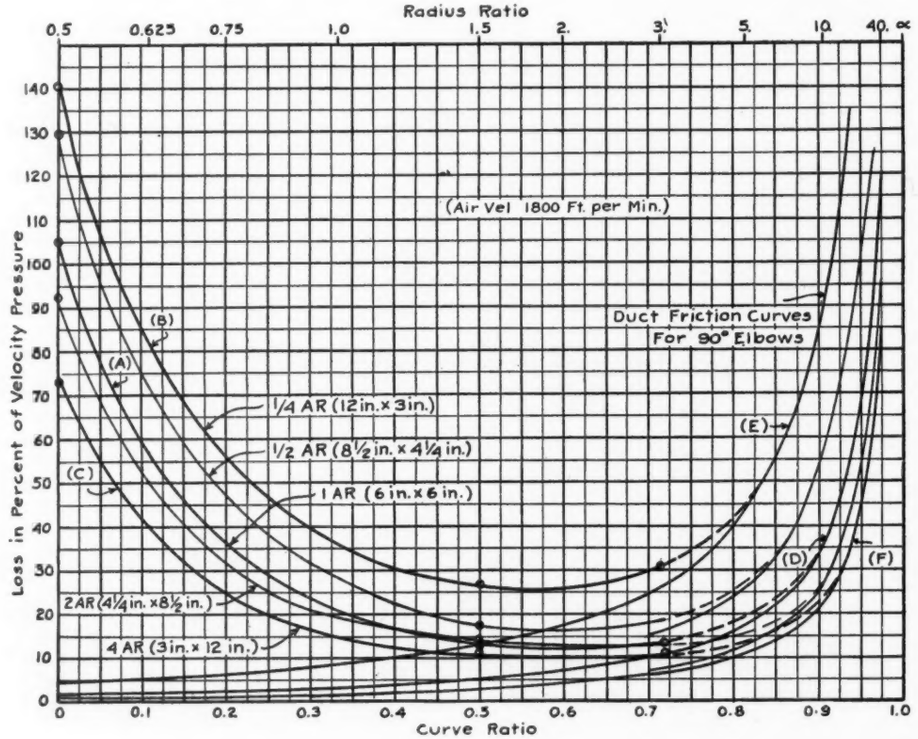


Fig. 7. Results of Tests of 90-Deg. Elbows Showing the Effect of Aspect Ratio.

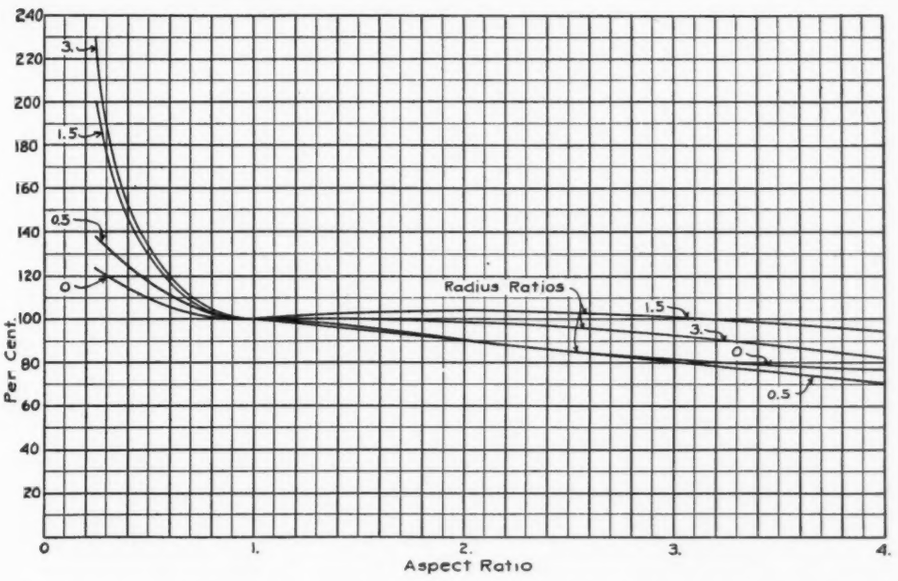


Fig. 8. Pressure Loss in Per Cent of an Aspect Ratio of Unity for Radius Ratios Varying from 0 to 3.

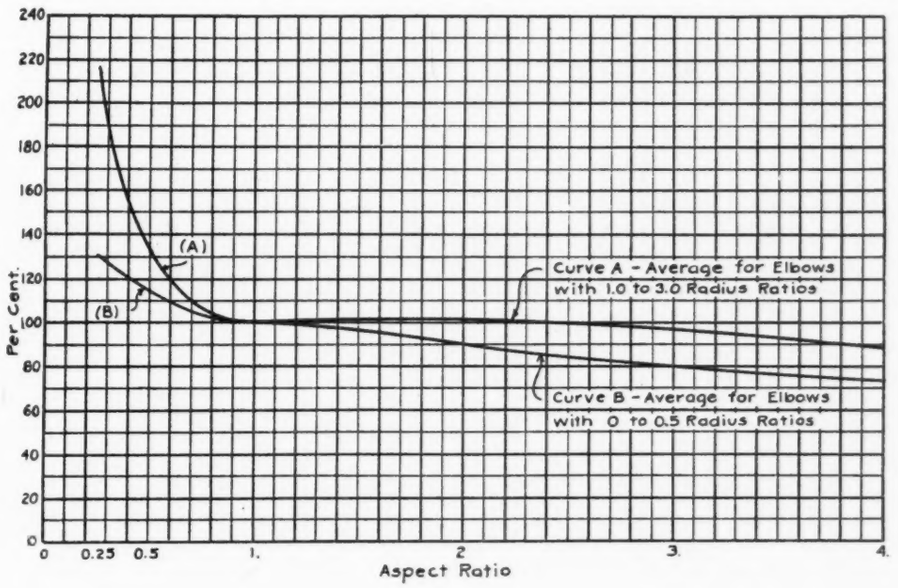


Fig. 9. Pressure Loss in Per Cent of an Aspect Ratio of Unity for Average Radius Ratios.

procedure was used to obtain data in the zone of low radius ratios for aspect ratios other than unity. However, the resulting curves, Fig. 7, are not easily applicable from an engineering standpoint. The percentage curves shown in Fig. 8 have therefore been prepared, based on an aspect ratio of unity. It is clear from these curves that the loss is still a function of the radius ratio. However, it is readily seen that the two curves in Fig. 9, one for the higher radius ratio of 1 to 3, which are normally used, and another for the lower ratios, where the inside corner is substantially sharp, will closely approximate the data plotted in Fig. 8. It will be observed that the slope of curve *A* in Fig. 9 at an aspect ratio of unity is nearly horizontal and continues so through an aspect ratio of 3, approximately. Contrary to general opinion, there is little harm in using aspect ratios as low as 0.75. This tendency for the slope of curve *A* to reverse as it passes through unity has also been noted, and in even greater degree, in tests of large ducts. In testing 28-in. × 38-in. elbows with a radius ratio of unity, the loss was 5 per cent less for an elbow with a low aspect ratio (hard bend) than for an elbow with a high aspect ratio (easy bend). In applying such information to elbows using splitters, it dictates the position of the splitter or splitters in the elbow and indicates that the respective elbows formed by the splitters should have approximately the same radius ratio. This will be discussed later in the paper.

Effect of the Degrees Turn of the Elbow

It has been assumed generally that the pressure loss through an elbow is directly proportional to the angle through which the turn is made. This is approximately true for 45-deg. and 90-deg. turns. If a large angle is used, there is a marked change in the proportionality as indicated by the curves in Fig. 10. This is not unreasonable in view of the fact that the air near the latter part of the turn has a flow materially different from that at the beginning of the elbow, which flow is assumed to be straight. During the first part of the flow

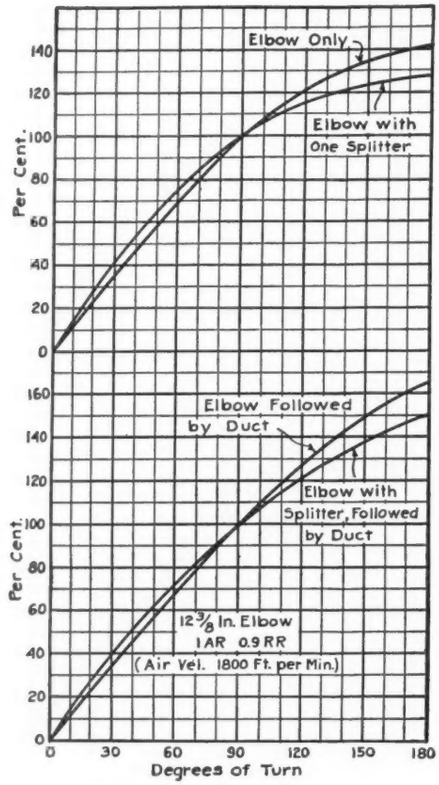


Fig. 10. Effect of Only the Elbow Angle in Per Cent of the Loss for a 90-Deg. Elbow.

in the elbow, a double spiral movement is formed which must be accelerated from zero. Later in the turn, the spiral movement has become more definitely established and requires less energy to maintain it. The curves in Fig. 10 show the effect of the degrees turn on the pressure loss in (1) an elbow with free discharge, (2) elbows followed by ducts, and (3) elbows with a splitter. These curves are based on tests of 12⅜-in. elbows having a radius ratio of 0.9 and an aspect ratio of unity. From the previously mentioned theory it would be expected that the curve become straighter, that is, the proportionality of the loss with the degrees of turn becomes more uniform as the curve ratio increases and the shock loss consequently diminishes.

The curves in Fig. 10 are factor curves for degrees turn only. Thus the loss in a 180-deg. elbow with a splitter is not just slightly less than such an elbow without a splitter, but rather is slightly less in proportion than the loss in the respective 90-deg. elbow; in both cases the splitter materially reduced the elbow loss as explained later.

Effect of Elbow Size

Size has very little effect on the pressure loss in most elbows. This is due to the fact that the loss due to the size of the elbow is principally a shock loss and is not greatly affected by duct friction. However, where the radius ratio is large or the aspect ratio small there is a greater effect. The curves in Fig. 11 show the losses in 3-, 6-, and 12-in. elbows with an aspect ratio of unity and with varying curves ratios. The solid curves at the left (superposed upon each other below values of 0.4 curve ratio) are the actual elbow losses obtained by test, while the solid curves at the right are the respective losses due to duct friction only. The dashed lines give the approximate values necessary to blend these into continuous curves. The duct-

(*Continued on page* 66)

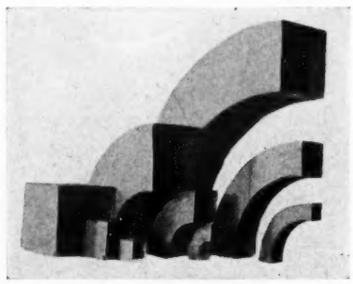


Fig. 12. Elbows of Various Sizes.

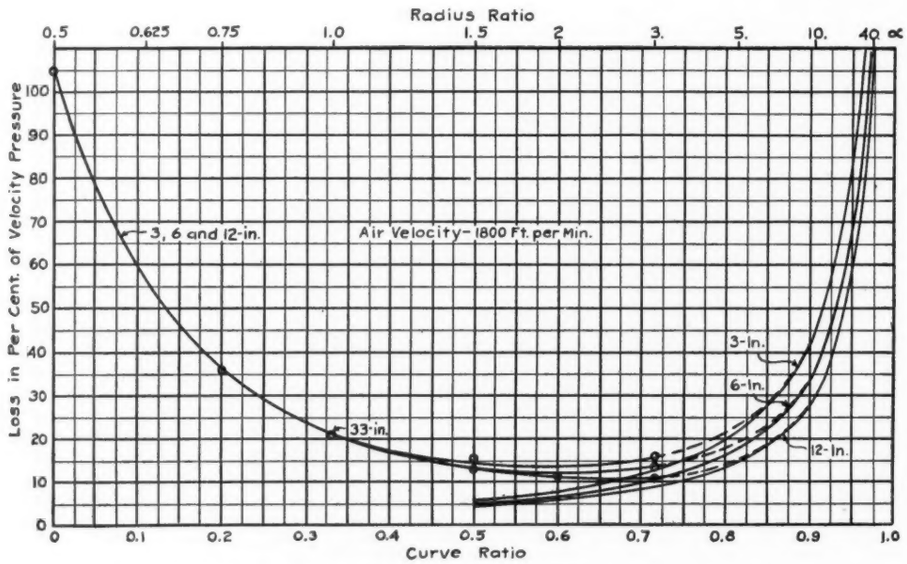


Fig. 11—Effect of the Size of 90-Deg. Elbows on the Pressure Loss.

Humidification A First Step In Air Conditioning Sales

By O. J. Kuenhold

Engineer, Monmouth Products Co.

Most readers probably think of mechanical circulation as the first step in an air conditioning sale. The author of this article suggests that adequate humidification be considered as the first step—especially where the owner may have had radiator heat. But there are some catches to the suggestion. Comments are invited.

CONDITIONED air heating has modernized old time heating by adding three new functions: humidification, filtration and forced air circulation. Of these three, humidification is frequently rated by physicians and prominent conditioned air heating engineers as most important to health. The advantages of winter air conditioning which appeal most strongly to the public are its hygienic advantages, and of these, humidification is unquestionably of highest importance.

The above, however, deals only with the relative importance of humidification to the purchasers of complete winter air conditioning. From another angle—the commercial viewpoint of those who manufacture, sell and install winter air conditioning equipment—humidification has far greater importance than is generally realized.

A Key to More Sales

Humidification is a natural sales leader in the winter air conditioning business. It is a key to open up a more rapid public acceptance of air conditioning. From this angle, humidification is of supreme importance to manufacturers of furnaces and other equipment associated with winter air conditioning, to wholesale jobbers of all such equipment and to heating contractors who sell and install it.

The purpose of this article is to introduce humidification to the heating trades in a new role—a powerful factor to increase winter air conditioning sales and profits.

Must Be Understood

Proper humidification involves much more than mere means to moisten air. The problem is not that simple. It requires scientifically designed equipment of adequate capacity even under the low bonnet temperatures of mild weather and blower operated furnaces. It must also include automatic controls to maintain appropriate humidity from mildest to most severe weather.

Unfortunately there is humidifying equipment on the market which actually works backward—increasing room humidity when it should be reduced and reducing it when it should be increased—evaporating insufficient water in the milder weather and entirely too much in severe weather.

Humidifying equipment costs less than other portions of conditioned air heating. Home owners who can not afford complete winter air conditioning frequently can afford adequate humidification and can be induced to buy it. Every purchaser of humidifying equipment becomes air condition minded. This means that within a year or so, if not immediately, he can be induced to purchase the rest of the equipment needed to give him a completely conditioned air heated home, provided that he has been sold humidifying equipment that gives him a satisfactory experience with his first step toward winter air conditioning. But, if such an obviously live prospect for complete winter air conditioning equipment has been sold apparatus which can not possibly give him a satisfactory job of humidifying, what chances remain to sell him the rest of the conditioned air equipment?

Poor Results Harmful

It should be apparent that makeshift humidification actually destroys more business and profits than it creates. Purchasers expect properly controlled humidity during any weather conditions; and when they fail to get it, the purchasers get the impression that air conditioning is still experimental, or even that it is "bunk." Worse yet, they spread the idea and that has very harmful results upon all air conditioning sales. Humidification should not be considered separately from conditioned air heating. Every sale of humidifying equipment should be regarded as a step to a sale of complete winter air conditioning.

What Is the Cost?

An impression prevails that the public will not pay more than a few dollars for humidification. If the one who makes such a statement will change it to "I can not sell humidification costing more than 15 or 20 dollars" it would be more accurate. Good humidification is not bought, like nails—it is sold. To sell good humidification the seller must know what humidification is. When the seller knows this, so he can explain it, he will have no difficulty to sell it.

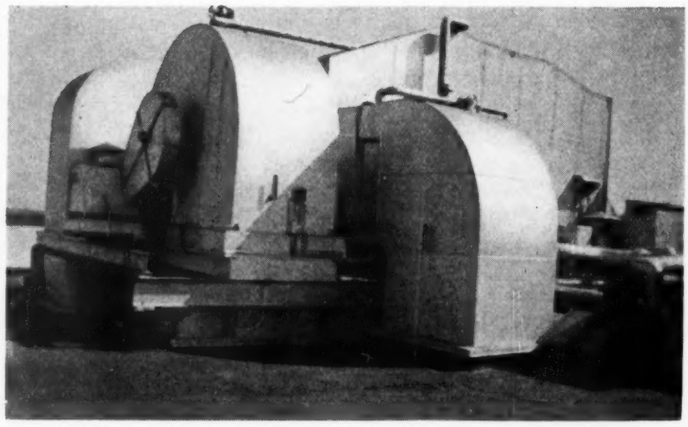
Other domestic appliances such as washers, ironers, electric refrigerators, which are sold in huge quantities, did not reach real volume sales until they were perfected.

When the heating industry gives the public the kind of humidification it expects then history will repeat itself.

The Higgins Building is a 10-story, fairly modern structure and now the largest air conditioned building in Los Angeles.

By Frank E. Hawkins
Los Angeles, Calif.

The blowers, motors, pumps, washers are grouped on the roof. For protection all metal is covered with one thickness of tar paper, two inches of cork, one inch of cement stucco and three coats of paint.



Installation Problems in Air Conditioning an Old Office Building

LOCATED at the south west corner of Second and Main Streets in Los Angeles is the Higgins Building, now considered one of the most modern structures in Los Angeles. The building was erected about twenty years ago but the owners and architect foresaw the direction of building trends and built a little beyond the times. So today, this building is one of the few buildings built years ago, which is 100 per cent modern.

The air conditioning system in this building was one of the few installed in 1934 and completed in 1935. The Higgins building is the largest remodeled office building in Los Angeles having complete air conditioning.

Apparatus and Operations

The equipment is located as follows. In the sub-basement is located three Freon compressors of 70 tons each, total 210 tons of refrigeration. Also located in the sub-basement are the instruments necessary for the compressor operation. The boilers are located in the basement.

Refrigerated water is piped to the air washers which are located on the roof. Also on the roof are the fans, motors, pumps and the other necessary instruments for complete automatic operation. The cooling pond and tower are on the roof.

The duct system was installed in the regular manner with government clips installed on 34-inch centers, to connect the sections of ducts together. The gauges used are as follows—greatest width 20 inches No. 26, up to 30 inches No. 24, to 48 inches No. 22, to 60 inches No. 20, and over No. 18, casings were made of No. 16 gauge iron and the cooling pond and tower were made of No. 12 gauge galvanized iron.

Metal Fabrication

All metal work for the installation was fabricated in our shop and delivered to the work in suitable sections for easy erection. The duct layouts were first checked from the blue prints and then as work progressed each portion under erection was checked again several times to eliminate all possible changes in dimensions due to obstructions. By this careful checking little or no trouble with non-fitting sections was encountered.

Metal Sequence

Main lines were erected first; then the branches were taken off and fitted. On large ducts the sections were delivered on the work as four pieces and assembled as hung. On medium sized mains sections were delivered in two pieces (top and side; bottom and side). All rectangular ducts less than 20 inches square were delivered completely assembled.

A suitable amount of pipe and fittings were made each day in the shop and delivered in the evening for erection that night as most of the work was carried on after office hours.

The supply grilles are of the diffuser type with a louvre in the back of each grille. In the duct system near each grille is a volume damper and at each branch is a splitter damper for regulation of the air flow.

The entire system of galvanized ducts was lined on the inside with one inch of insulation blocks. The recirculation and return lines are identical except they have plain lattice design grilles.

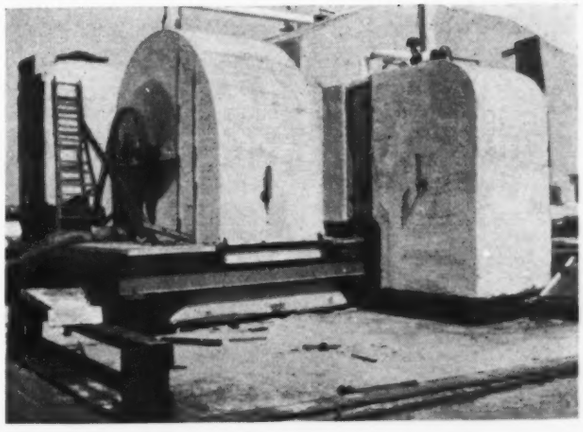
The equipment located on the roof is covered with one thickness of tar paper next to metal; then next to the paper is 2 inches of cork which is covered with one inch of Stucco cement and this was given three coats of gray enamel paint.

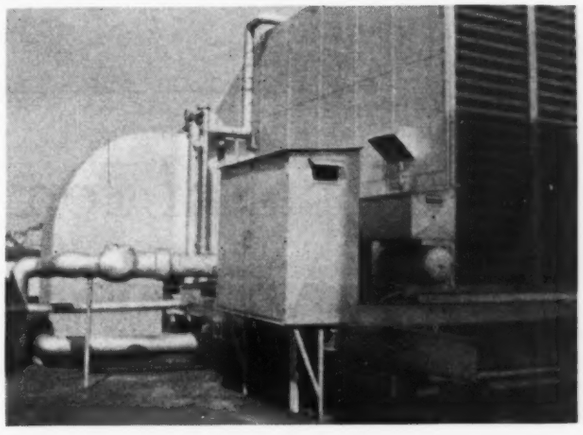
Circulatory System

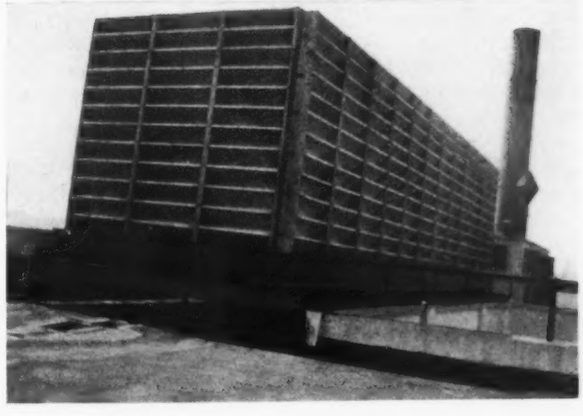
The cooled air from the fans and washers flows through ducts and risers from the main distribution system which is in the attic space above the tenth floor. The main ducts run from the corner where the fans are located two ways each main division serving two faces of the building. From the attic mains the risers run down through the floors behind furred out wall corners. In some cases these corners are on inside, corridor walls; in other cases in outside wall corners. The risers progressively get smaller the farther down through the building they go. Since the layout of offices is practically identical for all floors above the first the risers, branches and grilles occupy the same relative locations on all nine floors. The first or street floor is occupied by small shops having varying requirements and is not air conditioned.

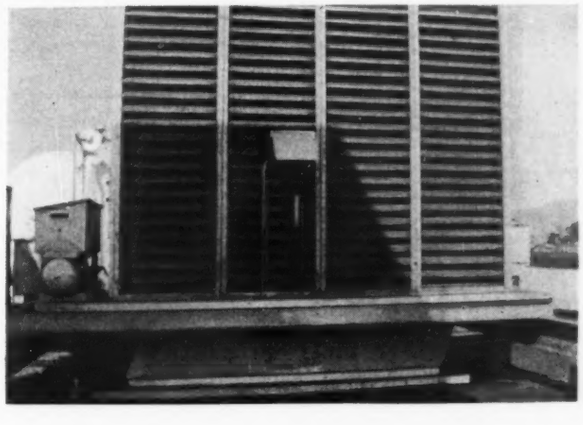
The system is 100% satisfactory and the building is 100% occupied.

◆ ◆

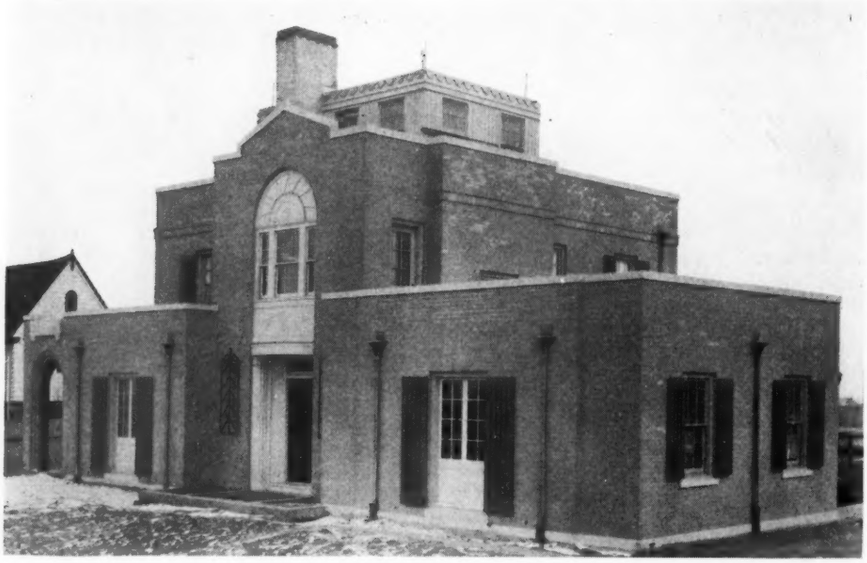








From top to bottom: 1—The fan-motor-washer group before final stucco coating. 2—Closeup of washer and pump. 3—The cooling tower for the compressor condenser. 4—Face of washer looking into filters.



The "Home of Tomorrow" was a two-story brick, 8 room residence with flat decks in the modern manner. Four inches of face brick are backed up by a 1-inch air space, building paper, ½ inch of insulating board, ⅜-inch studding space, ½-inch insulating board, ½ inch of plaster.

"The Home of Tomorrow"—

An Experimental Air Conditioning System

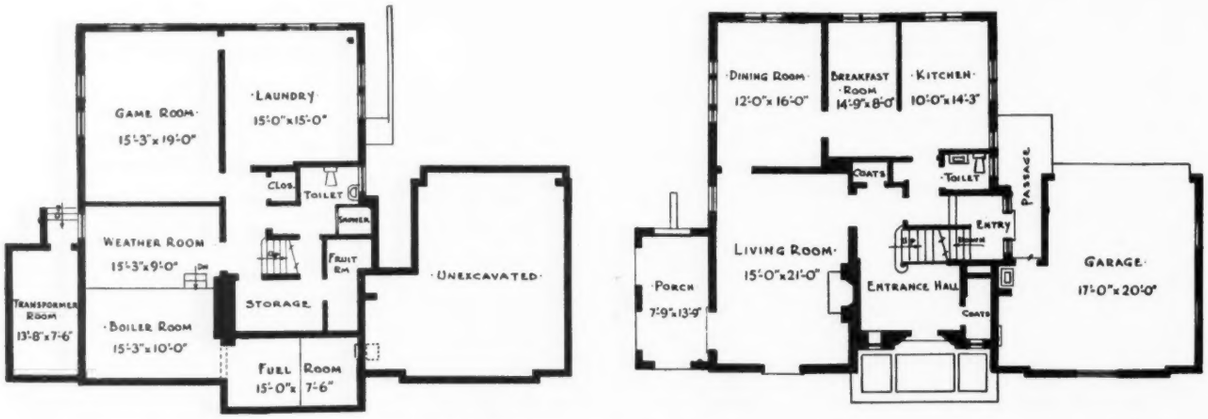
By J. F. Lamb

IN order to demonstrate future possibilities in the application of electricity to the home, a residence known as the "Home of Tomorrow," was recently constructed at Mansfield, Ohio. Most of the equipment, including the air conditioning system, was frankly experimental, and not available commercially. It was intended that the house serve as a "proving ground" for this equipment.

Description of the House

The Home of Tomorrow is a two-story brick veneer, 8-room house, approximately 32 feet, 9 inches wide, by 39 feet, 6 inches long, with garage attached. The house has a flat roof upon which is built a sun room 12 feet, 2 inches by 18 feet, 8 inches.

The walls of the house are constructed of 4-inch face brick on the outside, 1-inch air space, one thickness of building paper, one ½-inch thickness of insulating board, 3⅝-inch studding space, another ½-inch insulating board, and ½-inch plaster. The roof is constructed of 1½-inch insulating board nailed to 10-inch joists and plastered over for the second floor ceiling. Above the joists is a ½-inch thickness of insulating board, composition roofing, and finally, painted canvas. the cubical contents of the house are approximately 7700 cubic feet in the base-



At the left is the basement room plan and at the right the first floor showing room sizes and the general layout.

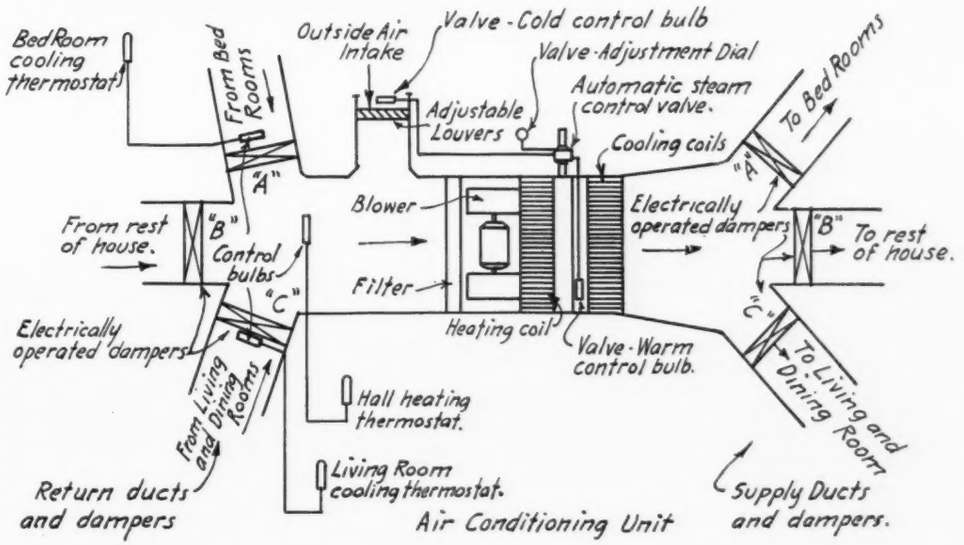


Fig. 3—This plan shows the arrangement of vital equipment in the "control room." Special attention is called to the zone dampers; the heating and cooling coils; the fan and filters; and the remote thermostat bulbs which reflect return air duct temperatures rather than room temperatures. Note that the returns also have electric dampers.

ment, 9500 cubic feet in the first floor, and 7100 cubic feet in the second floor, making a total of 24,200 cubic feet, excluding the sun room.

The house could ordinarily be constructed for about $12,000 excluding special equipment.

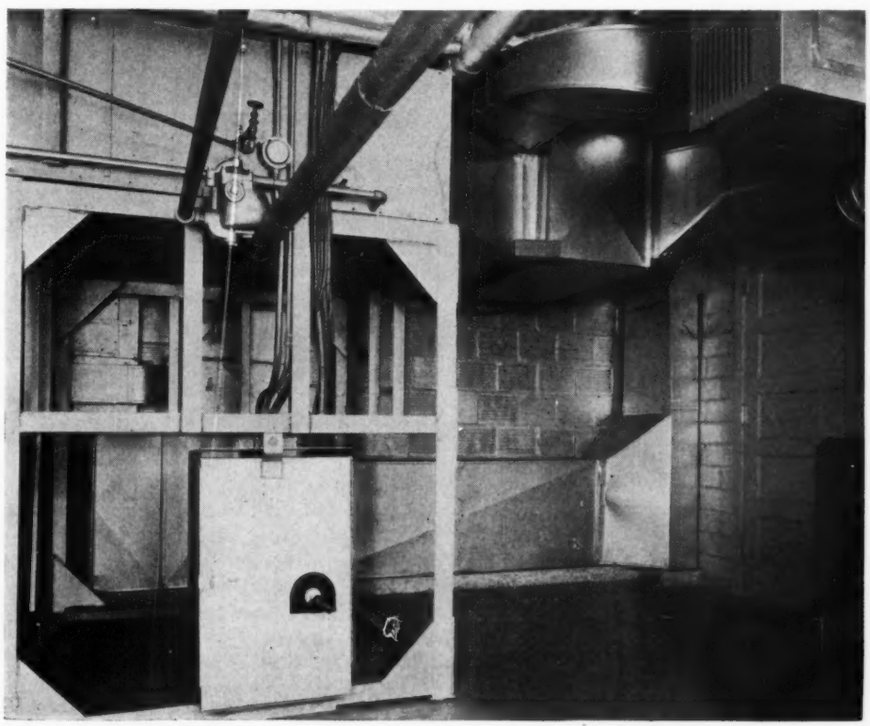
Selective Cooling

The following specifications are met by the air conditioning equipment.

1. Instead of cooling the complete house 100%, which would require equipment approximately of 53,000 B.t.u.'s per hour refrigerating capacity, the equipment is arranged to cool the house in either one of two ways:
   a, 24,000 B.t.u.'s per hour installed cooling capacity for total cooling of the living room and dining room at one time or total cooling of all the bed rooms at another time, as desired. (15° below outside temperature is considered as total cooling.)
   b. As much cooling for the entire house as can be obtained from the 24,000 B.t.u. per hour cooling capacity of the equipment as installed.
2. The equipment is designed for steam jet refrigeration at a future date, therefore, a steam boiler with a heat exchanger is used in place of a circulating warm air furnace.
3. An automatic oil burner furnishes the heat.

Heat and Cooling Loads

Table I shows the calculated heating load for the various rooms in the house. The heating capacity required is approximately 104,700 B.t.u. per hour in zero weather, excluding the sun room. The sun room is heated by separate electric heat-



The control room in the basement shows a collection of apparatus which fully meets any owner's desire to have his air conditioning system look like the highly interesting thing air conditioning is supposed to be. The apparatus and its winter and summer use is explained in detail in the article.

ers and is therefore not considered in the air conditioning system.

Table II shows the estimated cooling load for the living room, dining room, the three bedrooms, and the entire house. It can be seen that the entire house would require equipment of 53,000 per hour cooling capacity, whereas the 24,000 B.t.u. per hour cooling capacity actually installed is ample for satisfactory cooling of the living room and dining room together, or the three bedrooms.

TABLE I—CALCULATED HEATING LOAD
(Based on 0° F. Outside, 70° F. Inside)

Room	B.t.u.'s Per Hour	*Minimum c.f.m. for Heating
1st floor—		
Living room	9900	130
Dining room	7100	94
Breakfast room	3000	40
Kitchen	5900	78
First floor hall	9000	118
Toilet	2000	26
2nd floor—		
Main or northeast bedroom	7400	98
Southeast bedroom	6300	83
Southwest bedroom	5700	75
Bathroom No. 1	3500	46
Bathroom No. 2	2500	33
Book room	7400	98
Second floor hall	4000	53
Basement—		
Game room	15500	204
Laundry	12500	165
Toilet	3000	40
TOTAL	104700	1381
Sun Room	12300	

*Minimum c.f.m. for heating based on 135° F. register temperature and 65° air entering heating coils. Actual C.F.M. is greater on high fan speed to provide ready response, and less than the above on the low fan speed.

TABLE II. ESTIMATED COOLING LOAD B.T.U.'S PER HOUR

Room	Living Room	Dining Room	N. E. Bedroom	S. E. Bedroom	S. W. Bedroom	Entire House
Sensible heat—						
Radiation	3840	2880	2330	2070	1870	14575
Sun load	2900	3320	2130	2010	1800	13000
Lights	6200	1370	1200	1370	350	17100
People	1200	1200	400	400	400	1200
Air change	750	470	400	350	300	4500
Safety factor	1000	750	500	500	400	5000
Latent heat—						
Air change	720	450	400	350	300	7500
People	1200	1200	400	400	400	1200
Safety factor	200	200	100	100	100	1000
Night cooling load—						
Sensible heat	12990	6670	4830	4690	3320	43145
Latent heat	2120	1850	900	850	800	9700
Total heat	15110	8520	5730	5540	4120	52845
Daytime cooling load—						
Sensible heat	9690	8620	5760	5330	4770	38275
Latent heat	2120	1850	900	850	800	9700
Total heat	11810	10470	6660	6180	5570	47975

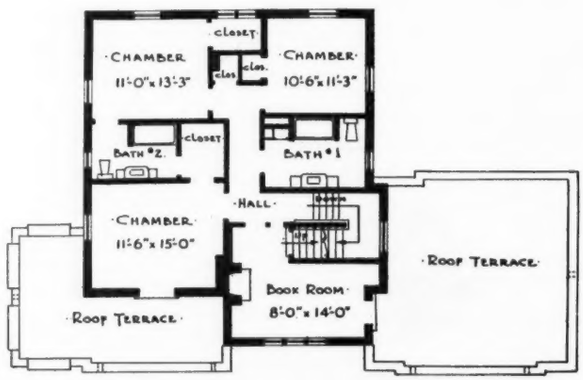
Night cooling does not include sun load. Daytime load does not include lights. Safety factor is added to take care of miscellaneous appliances and other undeterminable items. Calculation on basis of 15-degree cooling and one air change per hour. Due to double windows, 1 inch of insulation in the walls and 2 inches of insulation in the roof, the radiation and sunload and hence the total cooling load, are low for a house of this size.

The Air Conditioning System

The air conditioning system consists, briefly, of an oil burner, a steam boiler, an air-conditioning unit, duct system, and electrical control equipment. The oil burner and boiler supplies steam for the heating coils in the unit. The fan blows air over the finned tube heating and cooling coils in the unit and through ducts to the various rooms in the house.

Evaporator coils are provided in the unit and arranged so that a mechanical condensing unit can be installed to supply refrigeration for the cooling of the house in the summer.

In order to be able to cool the living room and dining room alone or the three bed rooms alone, as desired, the system of ducts supplying air to the various rooms of the house is divided into three



The second floor has four rooms, two baths and a hall and is flanked by flat decks on each end.

groups, each with electrically operated shut-off dampers in both the supply and return. One group consists of supply ducts to the living room and dining room with a set of return ducts from the same rooms. Another group supplies the three bed rooms and main bath room, and the third system of ducts which is also a supply and return system includes the rest of the rooms in the house. Fig. 3 shows how the central air conditioning unit is arranged with reference to the duct system. It should be noted that provision is included for taking in outside air.

The conditioning unit located in the "weather room," is composed of a fan section, a heating and humidifying section, and a cooling coil section.

The fan section includes two spun glass filter units. Two centrifugal fans are used and are driven by a direct connected motor mounted between them. The heating and humidifying section includes a finned tube radiator coil. The humidifier consists of a number of nozzles arranged to direct fine streams of water against carborundum targets.

The evaporator coil is the last section through which the air passes before it leaves the air conditioning unit and consists of three rows of finned tubes connected to a common header on the suction side and to distributing tubes and a thermostatic expansion valve on the liquid line side. The refrigerant used is dichlorodifluoromethane.

(*Continued on page 62*)

Air Filters in Air Conditioning Systems*

Control of dust and pollen is one of the major values of air conditioning. The commonest method of affecting dust control is through use of the air filter. The author explains dust characteristics and from test data shows the importance of filter type, placement, location, packing and relation to the system's operation.

One of last year's dust storms.

By Frank B. Rowley
Professor of Mechanical Engineering
University of Minnesota

THE purpose of this paper is primarily to discuss air filters and their application to air conditioning systems, but in order to get the proper understanding of the air filter problem it is desirable to know something about those materials which the filter has to handle. Impurities in the air may be either in the form of gases or solids, and while filters might be devised for absorbing the impure gases in the air those which will be considered here are for the purpose of removing the solid matter, usually in the form of dust.

No air is free from dust. It comes from practically every process which will cause the abrasion or disintegration of materials, and is thrown into the air by mechanical agitation, air movement, or any method which will tend to disturb the dust particles. It is created and stirred up by moving vehicles, and a great many industrial processes, and a constant source of atmospheric contamination is the smoke from chimneys from either industrial plants or private homes. Once the dust particles are in the air they will remain in suspension for periods of time varying from a few seconds up to several years depending upon the size and density of the particles. Dust particles range in size from those which can be easily seen with the naked eye down to particles which are so fine that they are only visible by the ultra-microscope. As a practical means of rating the dustiness of the air the average size of the particles and the concentration per cubic foot is often used.

How Size Is Measured

The diameter of dust particles is usually given in microns. As a note of explanation, a micron is one one-thousandth of a millimeter, or one twenty-five-thousandths of an inch. The average human hair is about 60 microns in diameter and a particle 10 microns in diameter is the smallest that is visible to the naked eye. The dust particles in which we are most interested are from perhaps 100 microns down to ½ micron.

Concentration Varies

The concentration of dust particles in the air varies over wide ranges, depending upon surrounding conditions. In clean country air, and especially after it has been washed by rain, the concentration may be only a few thousand particles per cubic foot. In average outside air, if there is such a condition, it will probably range around 500,000 particles per cubic foot and in many city areas it will run as high as 4 to 5 million particles per cubic foot. It is not uncommon to find air in dusty streets or around a smoky city which will run above 5 million particles per cubic foot, and in some surveys over 20 million particles have been common. The dust level in many industries, and especially in the dusty operations of those industries, will run into many million particles per cubic foot.

The fact that there is dust in all air need cause no great concern, as moderate concentrations of many dusts which are common in the atmosphere actually serve a useful purpose. It is the reflection of sunlight by the dust particles in the air which gives the morning and evening twilight period and the colorful sunrise and sunset. Dust particles also form the nuclei for rain drops, and if there were none to start the initial condensation of moisture the air would hold something like seven times as much moisture as it now holds before condensation starts. Under this condition we would probably be surrounded by a heavy, hazy supersaturated

*Paper presented at the First Annual Conference on Air Conditioning, held at University of Illinois, May 4 and 5, 1936.

atmosphere and any initial precipitation would be followed by terrific rains.

Health and Economic Aspects

While we are not concerned about the normal concentration of dust in reasonably pure air, there are objections to certain kinds of dust and to excessive concentration of any kind of dust. These objections may be from an economic or health standpoint. The economic loss may be due to the actual value of the dust itself in the air, in which case the recovery may be a necessary part of the industrial process, or the loss may be due to the effect on surrounding property and vegetation. The effect on the exterior of buildings and other property in dusty industrial sections is a common sight. Likewise, most people are familiar with the excessive dry cleaning and laundry bills caused by smoke and dirt in outside air, as well as in the interior of buildings.

Dust may have either a direct or an indirect effect on health. The dust and smoke over any given area shuts off the sunlight and is particularly effective in reducing ultra-violet rays. To aggravate the condition the dust particles form the nuclei for fine drops of moisture which cause the heavy fog over some industrial areas. Often these fine drops of moisture in the fog become coated on their exterior with the oily soot from the products of incomplete combustion and in this condition re-evaporation is retarded, thus aggravating the fog nuisance.

Chemical Composition Effects

Any direct effect which dust may have on health depends upon its chemical composition, the nature and size of its particles, the concentration in the air, and the length of exposure to dust and conditions under which it is breathed. Some forms of dust such as lead, arsenic, mercury, etc., are somewhat soluble in the blood stream, and act as poisons to the system. Impurities of this nature may affect the health not only by being taken into the lungs but by any contact from which they may be absorbed into the blood stream. In order that a dust may be harmful to the lungs or respiratory tract it is necessary, first, that it be of such size that it enters the lungs, and second, that it be either poisonous or of such physical properties that it will be irritating. The respiratory tract leading to the lungs contains very efficient air-filtering media. The large particles are first screened out as the air enters the nose, and the screening process is progressive until only those particles of 6 or less microns in diameter actually enter the lungs. The damage which such particles may do depends entirely upon the nature of the dust. In most cases the organic dusts are less harmful than the inorganic dusts, and it is usually considered that those dusts which are more nearly assimilated to the composition of the human body are the least harmful. Dust particles from 14 to 16 microns in diameter are screened out in the upper nasal passages, and some of them may cause an irritating effect known as hay fever. Pollen from various plants which are known to cause hay fever are really dust deposits in the air and may be treated as such.

Methods of Control

The dust problem is one which is always present for the air conditioning engineer and often requires a great deal of thought and planning to meet it successfully. There are at least three general solutions to the problem. The first and most effective method is to prevent the dust at its source. Unfortunately, however, this is usually beyond the scope of a particular air conditioning job, and something which must come about by a slow process of public education and the enforcement of specific regulations on the particular offenders. The air conditioning engineer must usually take the surrounding conditions as he finds them and give the air proper treatment for his requirements. The second possibility is to select the air from as clean a source as possible and thus reduce the cleaning problem. In most cases the dust concentration is different for various sides of the building and at various elevations. By some care in selecting the source of supply much may be gained in air purity. The third and final possibility is to clean the dirt and dust out of the air as it goes through the air conditioning system. This is primarily the function of air filters and the remainder of this paper will be devoted to a discussion of the types and characteristics of such devices.

Filter Requisites

There are many possible ways of cleaning dust out of air, but the filters which are in common use may usually be classified as dry filters or viscous coated filters. In this classification the dry filter implies a type that actually cleans the dust out of the air due to the fineness of its mesh. Thus a chemical filter paper or a fine felt pad may be so closely woven that the air will pass through, but the dust will be retained in the mesh. In the viscous type of filter some of the dust might actually be screened out but the filtering action is one of impinging the air on to a viscous coated surface which will retain the dust particles. These surfaces may be built up in many ways, but the retention of the dust is due to the fact that it sticks to the surface, and not to the fact that the particles cannot pass through the openings. In either class of filter there are certain fundamental requirements if it is to be successfully used in an air conditioning system. Four of these requirements are:

(1) High efficiency, or dust arresting power.

(2) Low resistance to the flow of air through the filter.

(3) High dust-holding capacity, or long life in service.

(4) Economy in first cost and upkeep.

In addition to these there are other requirements such as freedom from odors, fire resistance, uniform efficiency over a wide range of air temperatures, low moisture absorption, etc.

[To be continued]

The Insulating Value of Aluminum Foil

By S. Konzo

Special Research Associate, Engineering Experiment Station, University of Illinois

A BETTER understanding of the insulating value of aluminum foil insulation can be obtained when it is expressed in terms of the equivalent thickness, of some common form of insulating material, which would be required to produce the same insulating effect. As a basis of comparison the writer has selected the ordinary wool type of insulation. These wool types, whether consisting of rock wool, glass wool, or other fibrous materials, have about the same insulating value per inch of thickness of material.

The commonly accepted value for heat conductivity of these wool type insulations is "0.27 B.t.u. per square foot of area, per degree difference in temperature (from surface to surface), per inch thickness of material." The heat conductance for any other thickness can be obtained by dividing the value for conductivity by the value for thickness of material. For example, the heat conductance of a two-inch layer of rock wool would be equal to 0.27/2.0 = 0.135 B.t.u. per square foot per degree difference in temperature.

A graph showing the heat conductance of mineral wool insulation for various thicknesses of the material is shown in Fig. 1. It may be noted that the value for heat conductance decreases quite rapidly as the thickness of insulation is increased. This is especially true for thicknesses up to three inches.

The notation (a, b, c, etc.) in Fig. 1 indicates the values of heat conductance for various arrangements of the aluminum foil type of insulation, which are shown in the diagram on the left-hand side of Fig. 2. For example, arrangement "a" consisting of one layer of aluminum foil, placed on one face of a wall spaced ⅜ in. from another wall, has a heat conductance equal to 0.62 B.t.u. per sq. ft. per degree difference. It may be noted from Fig. 2 that arrangement "a" is equivalent in heat conductance to 0.44 inch of mineral wool placed in contact against a wall surface.

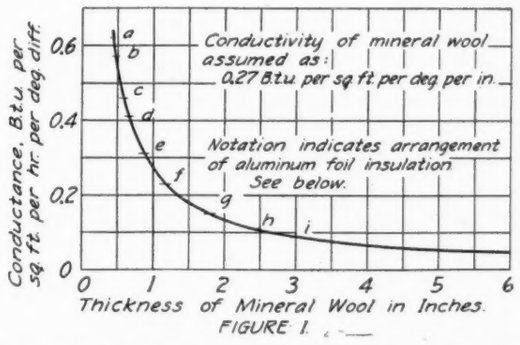


Fig. 1—Conductance of mineral wool for varying thicknesses. The notation on the curve indicates the arrangement of the aluminum foil insulation having equal values of conductance.

The conductance values for the nine arrangements of the aluminum foil insulation are those determined from tests conducted by F. B. Rowley at the University of Minnesota. (See paper entitled, "Insulating Value of Bright Metallic Surfaces" in Journal Section of ASHVE., Vol. 6, No. 6, June, 1934, Heating, Piping and Air Conditioning.) These conductance values were in every case superimposed on the curve shown in Fig. 1 and a value of equivalent thickness of mineral wool was thereby determined.

In order to show the relationships between the two types of insulation, the writer has prepared the graphical representation shown in Fig. 2. It should be understood that the conductance values for aluminum foil insulation were based on tight installations which did not allow the air to leak from one air space to the adjoining space.

An inspection of the values tabulated in Table 2 indicates some interesting relationships, as follows:

1. The value for heat conductance for foil insulation decreases when the width of the air space between the foil insulation and the wall is increased from ⅜ in. to ¾ in. Compare arrangement "a" with "c"; also arrangement "b" with "d."
2. The insulating effect of a curtain, composed of two bright surfaces, is better than that of an air space faced with aluminum foil. Compare arrangement "e" with "b"; also arrangement "f" with "d."
3. An increase in the number of curtains of foil insulation increases the number of air spaces, thereby decreasing the conductance. Compare arrangement "f" with "g."
4. Four curtains of aluminum foil placed in a space 3¾ in. wide give an insulating effect equivalent to 3 inches of wool insulation.
5. In order to obtain the same insulating effect produced by 3⅝ in. of mineral wool installed in a studding space, five separate curtains of aluminum foil each spaced ¾ in. from each other will be required. The total space requirements for the aluminum foil insulation in this case will be 4.5 inches.

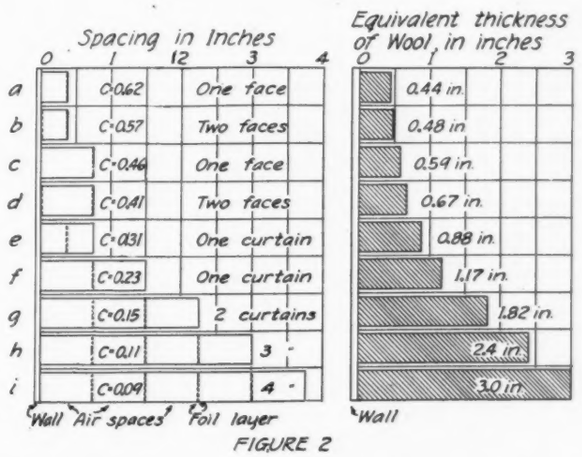


Fig. 2—Graph showing equivalent thickness of mineral wool to produce the same heat insulating effect as certain arrangements of aluminum foil insulation.

OPEN for DISCUSSION

Readers are invited to contribute their experiences or suggestions to the topics under discussion. Sketches showing your ideas are desired.

Heating and Ventilating a Dry Cleaning Plant

American Artisan:

We are enclosing two blue prints of an old residence, which is being remodeled into an office, cleaning and manufacturing building. The architect has asked that we discuss with someone a number of points concerning the heating and ventilation of this building.

The people working in this building will be working on very expensive draperies, which must be kept free from all dirt and dust, consequently extreme cleanliness in the heating system is absolutely necessary.

For this reason, he is eliminating as many windows as he can and in fact would like to eliminate the windows, which are now indicated on the plan, if he felt sure that our proposed ventilation of this building would be successful.

It is our intention to install an oil fired furnace in the portion of the building indicated on the blue prints. It will be necessary for us to run the warm air supply ducts under the present floors to reach the various rooms to be heated. He will allow us to run stacks to the second floor in practically any place we say they will be necessary.

As you will note from the blue prints, the entire front portion of this office building is to be built out of the glass brick to supply the necessary light for the large general office and the large work room upstairs.

The architect is not worried or uncertain about the successful heating of this building during the winter, but there is a question in his mind as to whether we can successfully ventilate this building satisfactorily in the summer.

For summer ventilation, it was our intention to supply a sufficient quantity of air to provide about twenty air changes per hour for this building. We did not feel that it would be satisfactory to recirculate this air and we proposed running a fresh air shaft through the storage room, which will open above the roof of the one-story addition at the rear of the building.

All of the ventilating air would be drawn from outdoors at all times and would then be distributed throughout the entire building. We then proposed to install an exhaust fan in the attic space above the second floor and exhaust the air from the two stories. This fan would discharge to the outdoors through the space we have indicated on our second floor plan.

The main worry of the architect is whether during the summer, without any windows open, we can keep the air in this building fresh and not allow it to become stagnant, which would create very unsatisfactory working conditions.

If one large exhaust fan is too large for the space available, we can very easily install two fans—one over the front part of the building and one over the central part of the building.

It is fully understood that during this time they are to receive absolutely no lowering of temperature within the building—the air being supplied for ventilation only.

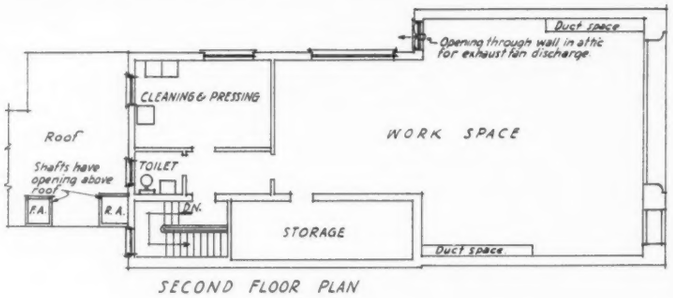
One of the questions on which we are in doubt is whether it will be more satisfactory if all of the exhaust ducts from the first and second floors, which will run into the attic, are connected by pipes directly to the intake of the exhaust fan or whether it will be just as satisfactory to allow these stacks to open into the attic space and allow the fan to pull from the entire attic space.

We intended to use the same blower for ventilation as for heating and size all of our supply ducts for summer requirements. Of course, this would mean slowing the fan down considerably in the winter and we would also have a very low velocity in the supply ducts during this time.

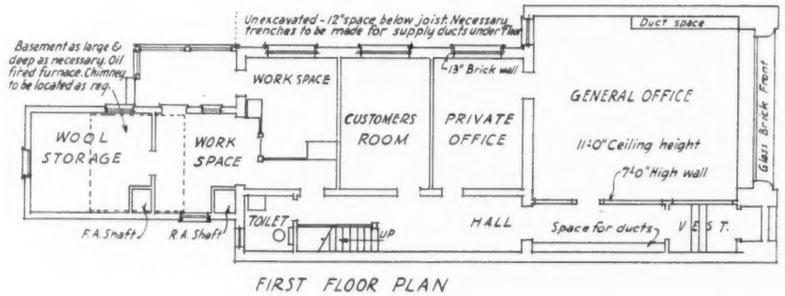
During the heating season, we propose to return the air from the attic space of the building through a return air shaft, which would be built where indicated on the blue print. This, of course, to be connected to the supply blower. Any outside air, which would be necessary during the heating season, could be supplied through the fresh air shaft.

We would also appreciate it if you would advise us whether you would recommend introducing the air near the floor line of each room, or whether we should introduce it approximately eight feet above the floor line.

Also, in either case, where you would locate the vent openings—



SECOND FLOOR PLAN



FIRST FLOOR PLAN

would you recommend the locations be the same for both the heating and the ventilation?

It was our intention to operate both the supply and the exhaust fan at the same time during the time when air for ventilation was required. During the heating season, of course, the exhaust fan would not be used.

On the blue print is listed the type of construction of the building and the insulation which will be used over the entire second floor.

Since this is the first job of this type that we have been called in on, we want to be sure that what we propose will be satisfactory.

◆

Suggestions by The Editors

In reply to your letter asking for suggestions on the proposed winter heating and summer ventilation of the remodeling of a commercial building, we confess that we are not familiar enough with the average daily range of temperature in your locality to judge whether or not straight ventilation will provide satisfactory working conditions. Furthermore, it seems to us that the owner should be fully aware of the fact that straight ventilation will not reduce temperatures and the psychological effect of no windows or all closed windows may result in the need for such volumes of air through the building as will provide an actually noticeable air movement over the workers. In several instances we have noted that straight ventilation seems to fall down because those exposed will not acknowledge that mechanically circulated air in closed rooms is as desirable as air movement through open windows.

Your letter says that you have made this clear to the owner, but we suggest that you call his attention to this psychological fact. We see nothing wrong with your proposed plan of bringing in outside air through an outside air shaft opening above the roof, through a basement blower, which will build up a pressure in the rooms and exhaust the air by means of a large exhauster in the attic.

The real difficulty, as we see it, will be encountered in the practical problems, some of which you have mentioned. First of all, the matter of clean air. If all windows are sealed and the air of the basement blower is passed through filters, there should be no reason why the air inside the building cannot be practically 100 per cent clean.

Our experience with ventilating systems (and this experience seems to be borne out by a number of contractors), is that the control of air movement inside rooms is extremely difficult. For example, if we introduce air at the baseboard or high sidewall on an inside wall and exhaust an equal amount of air from a baseboard or high sidewall or ceiling grille along the outside wall, we can draw nicely trained arrows on our plans, but to actually make the air follow these paths is often times difficult.

S. Konzo and J. H. Van Alsburg have brought out this point in their articles, indicating the dispersion of high velocity air within a very few inches of the supply or return grille. This dispersion of air seems to result in stagnation along the central areas of any sizeable room.

We have tested register velocities as high as 1,000 fpm. in our test houses and have found it practically impossible to run the anemometer five feet away from the register. The only solution seems to be the employment of register faces which provide a jet effect.

E. B. Lau, the blower manufacturer, told us not very long ago that he placed a blower in his attic of a size which would give forty air changes per hour for the whole house and that last summer when he wanted to be really comfortable in his dining room, he had to close all the windows in the house except those in the dining room and permit the full power of the fan to operate through these dining room windows. Under this arrangement, he was able to secure a noticeable air movement, but when all windows on the first floor (to say nothing of all the windows in the house) were open he did not secure a condition which felt comfortable. True, he was changing the air in the house very rapidly, but the cooling effect must come from the movement of air across the body or the reduction in temperature of objects and walls so that bodily radiation can become effective.

From the above information you can judge that we are somewhat dubious about the comfort effect obtained by straight ventilation. We are sure that night air cooling is a very sensible plan, but we are also convinced that its effectiveness does not depend upon the movement of air over the body so much as it depends upon reduction of temperature in walls and objects. Straight ventilation in an establishment like a restaurant where large quantities of very warm air and steam are generated is a decided advantage because it pulls out this air to be displaced by air much lower in temperature and probably of a lower relative humidity, but when we come to a proposition such as you outline, where you propose to depend upon ventilation for comfort effect, we frankly admit that we are somewhat dubious.

In answer to some of your specific questions, if we were doing this job, we believe we would introduce the air at high velocity at the eight foot level, and use directional flow registers so as to obtain a jet effect. We believe we would also use a large number of registers wherever this is possible, so that several currents of air can be thrown across the room.

For return air in the heating season, the University has determined that baseboard grilles are best with either baseboard or high sidewall supply. For exhausting air in summer, a ceiling grille, to our mind, is best because it will pull off the hot air which lies against the ceiling and above the top of the door openings.

It seems to us that we would prefer to connect all rooms direct to the exhaust fan in the attic, and would size the stacks and ducts very carefully in order that with the aid of slight damper settings it would be possible to control accurately the flow of air from each room or part of the building. We are of the opinion that if all stacks open into the attic and the fan pulls from the open attic, you may encounter some difficulty in getting air circulation from some rooms. Theoretically it would seem that if the supply fan builds up an equal pressure in all rooms, we should be able to exhaust according to requirements from each room without direct connection, but our experience has been that this is sometimes difficult.

In checking the plan, it seems to us that some of the smaller rooms are going to have very low velocities in branches for winter heating and undoubtedly you will have to compensate for air temperature drop in the ducts. We have not worked out the cfm requirements as we can only approximate them from the plans, but it looks as though you will have to use rather high duct velocities for summer ventilation if you wish to avoid too low velocities in winter heating.

We take it from the last paragraph on page two of your letter that there will be no direct line from rooms to supply fan, but that you intend to pull all air from the attic, and of course if the attic fan is direct connected, this will present some difficulty. From the general layout of the two floors, it would seem as though you could return from two places on each floor for winter heating without building up too large an amount of metal work.

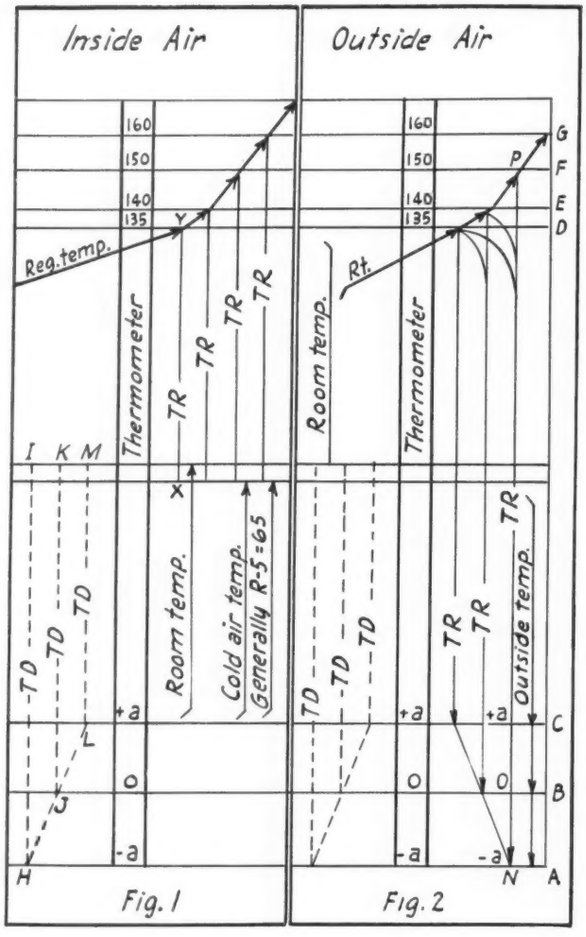
One good example of such a job which either does or does not work would probably be of much more use to you than our theoretical considerations. Therefore, we are taking the liberty of submitting your problem to several engineers with the hope of finding someone who can give actual experience.

◆

Suggestions by Edwin A. Jones, Chief Engineer, The L. J. Mueller Furnace Co., Milwaukee

If this proposition as presented were put up to me by an architect, I would discourage the whole idea. What people have in the back of their heads when they talk about ventilating systems such as this is always

(*Continued on page* 59)



Temperature Rise and Temperature Difference

By William Scott

Bradfordwoods, Penna.

It often happens that room temperature, temperature difference and temperature rise are each the same number of degrees—a fact rather confusing. For instance, if the thermometer shows zero for outside air, 135 degrees at register, and 65 degrees in cold air pipes, then TD and TR and room temperature will each be 70 degrees. However, they may all be different, as shown graphically in the accompanying chart, composed of Fig. 1 and Fig. 2, in which temperature differences are shown by dotted lines on the left of the thermometer, and temperature rise on the right of the thermometer by continuous lines. Fig. 1 is for re-circulated air, and Fig. 2 for outside air.

HEAT losses from a room occur only when it is colder outside than inside. If no artificial heat is supplied, the temperature outside and inside will be practically the same, but as soon as heat is supplied, it begins to escape, and the loss must be constantly replaced by the furnace in order to maintain a definite room temperature.

The first half of the heatman's problem is to estimate the heat losses, which are expressed in British thermal units (B.t.u.), one of which will raise the temperature of a pound of water one degree. But .24 of a B.t.u. will raise the temperature of one pound of air one degree.

A cubic foot of air at zero temperature weighs .08636 lb. and at 70 degrees, .075 lb. Also, the air filtering into the room enters at outside temperature, generally taken to be zero, and must have its temperature raised to room temperature. Now, .24 × .08636 equals .02 B.t.u., the amount needed to raise the temperature of one cubic foot of air one degree from zero. Thus is derived the one-degree infiltration factor for one change of air per hour. Factors for glass, walls, etc., can be obtained from authoried tables. Having multiplied cubics by the infiltration factor, and glass, walls, etc., bv their respective factors, the sum of these products, which may be designated as S, is the heat loss (HL) for one degree of temperature difference (TD), and S × TD = heat losses (HL).

T. R. and T. D.

Temperature difference is the difference between room temperature and the temperature outside. Look at the dotted lines in the chart, and think of this definition.

Temperature rise is the increase in the temperature of air due to imparted heat. If air is re-circulated as shown in Fig. 1, the increase will be from about 65 degrees to register temperature, if room temperature is 70 degrees. If the air is taken from outside, as indicated in Fig. 2, the temperature increase will be from outside temperature to register temperature.

Considering air to be measured at 70 degrees, we derive from its known density and specific heat the important fact that 1.08 B.t.u. per hour will raise the temperature of one c.f.m. one degree; hence 1.08 × c.f.m. raises the temperature of the hourly air one degree and 1.08 × c.f.m. × TR is the heat required to raise the hourly air to register temperature and thus balance the heat loss.

A Visual Chart

Most residence jobs require re-circulated air, as shown in Fig. 1. The computed heat losses amount to S × TD, expressing what nature does hourly, and the supply, formula, 1.08 × c.f.m. × TR, indicates just what is to be done about it.

But loss and supply are equal; hence the funda-

X marks the spot

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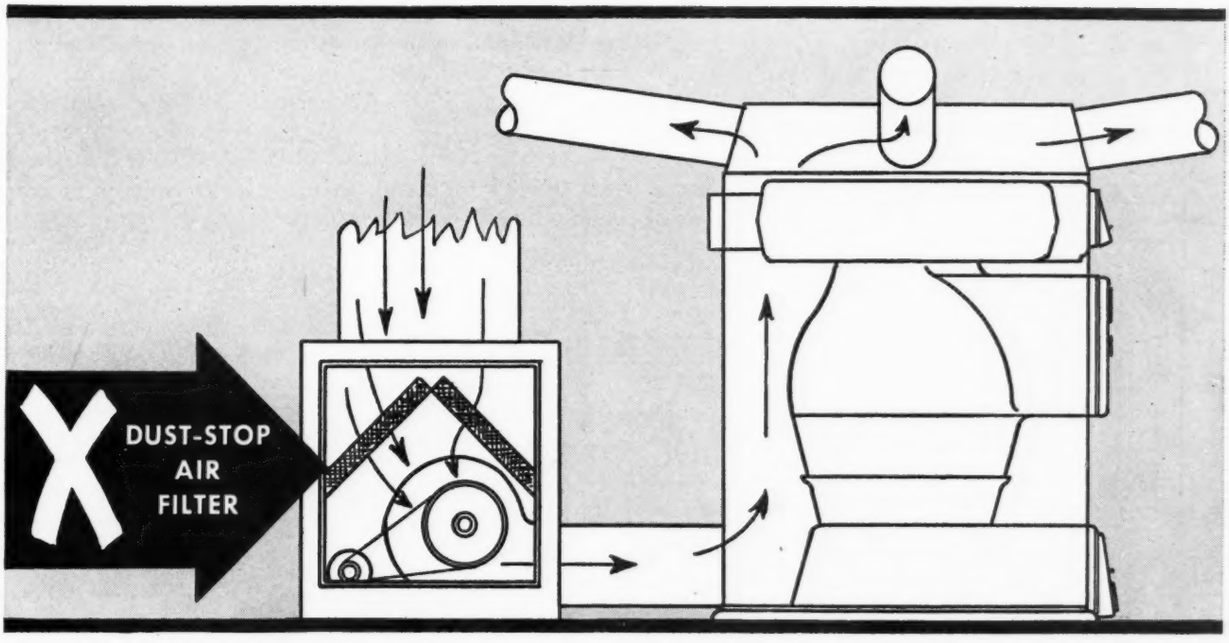

● Don't take the hard road to selling. Most people are not mechanically minded and do not understand the theories involved in modern heating appliances. But the housewife knows what you mean when you talk about CLEAN AIR . . . less housework . . . less cleaning of furniture, drapes and walls . . . healthier air to breathe. You talk her language when you talk DUST-STOP advantages. DUST-STOP filters catch and hold dust, lint, pollen and dust-carried bacteria and prevent them from recirculating throughout the home. Begin the sale of a blower or air conditioner at the filters. DUST-STOP makes selling easier . . . standard equipment on the industry's outstanding blowers, air-conditioning units and warm-air furnaces. Owens-Illinois Glass Company, 301 Madison Avenue, Toledo, O.

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mental equation: S × TD = 1.08 × c.f.m. × TR.

Now, consider a common example, where nature has fixed zero as the outside temperature and the installer has selected 135 degrees as his register temperature. The line JK in Fig. 1 is the TD, and measures 70 degrees on the thermometer. Line XY, which is the TR, is also 70 degrees. If the computed heat losses for one degree difference of temperature are found to be 300 B.t.u. the equation above becomes:

$$300 \times 70 = 1.08 \times \text{c.f.m.} \times 70.$$

$$\text{Simplifying, c,f,m, } = \frac{300}{1.08}$$

But in practice, c.f.m. = 300 with an eight per cent safety allowance. So, in all cases where TD and TR happen to be equal,

S = c.f.m. with an eight per cent safety allowance.

Adjusting for Outside Temperature

Having found the c.f.m. for zero temperature, adjustment may be made for any other outside temperature, thus:

For each ten degrees above or below zero, add or subtract 1/7th to or from the c.f.m. computed for zero weather. In the foregoing example, outside temperature of 20 degrees below zero would necessitate 9/7 × 300 c.f.m. For — 10 degrees 8/7 × 300 × c.f.m. would suffice.

Whatever the values of S and TD and TR, simply substitute them in the fundamental equation in order to find the value of c.f.m.

Outside Air

If outside air is required, conditions obtain as illustrated in Fig. 2, and TR for the room under consideration becomes 135 degrees as represented by line BD or its equivalent. However, register temperature, room temperature and c.f.m. will remain the same regardless of the source of air.

But more heat will be needed for outside air, and the right amount will be ascertained from the following equation:

B.t.u. = c.f.m. × 1.08 × TR.

Substituting, B.t.u. = 300 × 1.08 × 135 = 43740, total heat required of the furnace.

Mixed Air

If air is taken both from outside and inside, this equation becomes:

B.t.u. = 1.08 × (c.f.m. from inside × their TR) + (c.f.m. from outside × their TR) which means:

To find total B.t.u., multiply c.f.m. from inside by TR for inside air as shown in Fig. 1. Multiply c.f.m. from outside by TR for outside air as shown in Fig. 2. Add these products and multiply the sum by 1.08. The result is the net heat load.

In case of the room already considered, if 200 c.f.m. are taken from within and 100 c.f.m. from without, the solution is: (200 × 70) + (100 × 135) × 1.08 = 29,700 B.t.u., net heat load.

Ventilating a Dry Cleaning Plant

(*Continued from page* 55)

getting something that will approximate in effect the results of air conditioning, and it simply can't be done.

The expense of a duct installation to move approximately 6000 C.F.M. and the necessary cost of air handling equipment and filters would not be justified, in my opinion. If they want to get as comfortable results as possible, without refrigeration, then fans in the room are the best answer. Since to get effective cooling by air movement we must have air discharged at velocities of 1200 to 3000 feet, and in order to get effective air movement throughout the rooms must move considerably more than 20 air changes per hour, a fan in the room is by far the cheapest way to achieve these results.

As a matter of fact, trying to get results from a duct system equivalent to that secured from fans located right in the room will usually amount to at least ten times the power consumption.

No statement is made as to the amount of heat which will be generated in the work space, but unless this is considerable it is my opinion that during the warmest portion of the day they would be better off to cut down their fans.

While night ventilation is very effective for residences where windows can be opened and a considerable amount of air moved through the house to absorb heat from the walls, furnishings, etc., and replace the warm air with cooler night air, it does not ordinarily produce enough air movement to be of assistance when outside temperatures approach indoor temperatures and its effect is detrimental rather than beneficial if the outdoor temperature is higher than the indoor temperature. Its practical application is confined to residence sections where the use of filters with the added resistance is not necessitated.

I have not calculated the cooling load of this building, nor is sufficient data supplied to enable me to do so with any degree of accuracy. However since it is stated that but little outside air will be used in winter I assume that processes and occupancy are such that no great amount of ventilation is essential and an outside air supply of 500 cubic feet per minute or less would be adequate. This being the case, it certainly appears to the writer that the logical thing to do would be to install an air conditioning system having a duct and fan capacity of 2000 to 2500 C.F.M. and if the present outlay is not too great, install necessary cooling equipment, which probably would not make the first cost as much greater than the contemplated installation as is apparently anticipated. If the investment at this time in summer air conditioning is not justified, I would recommend the installation of the job suggested with the provision for its addition if necessary.

It is my opinion that if the large volume ventilating job is installed it will prove unsatisfactory and if and when it is decided to install a cooling job, the ventilating installation will be a white elephant.

◆

Suggestions by T. W. Torr, Heating Engineer, The Rudy Furnace Co., Dowagiac, Mich.

To figure a satisfactory system I would proceed as follows:

Figure the heating and ventilating load for winter requirements, by recirculating air for heating requirements introducing enough outside for ventilation according to requirements. From the information at hand it would not seem necessary to provide an exhaust fan. Just use stacks of proper size capped with ventilators.

A control humidity device should also be provided.

For summer I would suggest using the same air volume as for winter with cooling equipment. Reducing the temperature by cooling would in this case be better than trying to produce a cooling effect by circulation.

Suggestion by
J. E. Maynard,
Chief Heating Engineer,
The Fox Furnace Co.,
Elyria, Ohio

This inquiry deals with a commercial problem which is out of our line. Personally, the general content of your reply coincides with my views, though I have not as yet had an opportunity to participate in nor investigate a problem of this nature. We are now concerned with a problem of comfort ventilation for our Engineering Department which occupies two floors of an old building. As yet we have not decided upon a satisfactory solution. After completing the installation and observing the result of same we may have something of interest to pass on.

Your comment upon E. B. Lau's experience is very interesting and should be carefully considered by your client.

Specifically, the thoughts you expressed in paragraphs eight to twelve inclusive, are logical and particularly the last two paragraphs. The thought expressed by your client, of using "the same blower for ventilation as for heating" and sizing all of the ducts for summer requirements is doubtful. The fan or blower characteristics might be such that when the R.P.M. is reduced, for winter heating purposes, that sufficient velocity head or pressure would not be available for proper distribution of the air.

I believe that Guy Voorhees or Platte Overton will be more likely to pass on definite information pertaining to the problem.

◆

Suggestions by
F. H. Whitcombe,
Engineering Dept.,
The Lennox Furnace Co.,
Marshalltown, Iowa

We have not had very many installations of this sort. Quite frequently, though, it is necessary to provide blower equipment and design for ventilation work for stores and small buildings along with ventilation work of course in residences and schools, public buildings and auditoriums.

Your reply to this interested party certainly does call out the several points of question in providing a ventilation system. It is no more than right to bring out these points of question in design particularly regarding cooling and the amount of cooling effect that will be derived from such a ventilation system. We all know that there is a definite comfort sensation from having air in motion. It is difficult to give a decided breeze sensation without handling a very frequent air change. When a large air change or quantity of air is handled through a room very careful distribution must be effected so there will not be just air streams throughout. To effect this distribution, satisfactory results can normally be had if the customer can justify the expense of directional type grilles especially designed for a given job.

We have found that if proper diffusion or distribution of the air is effected through the correct directional type outlet that the exact location of the return air does not make much difference. For ventilation work, it is true that the exhaust from the room very satisfactorily can be located at the ceiling line. When this ventilation system is to be used year around, for heating and for summer use, it is well to two-way the stack between the base board and the ceiling line. This necessarily means that the stack near the ceiling line has to be equipped with a louvre for closing off. When it is open, of course, the air will take the line of least resistance and go out that opening rather than at the base board. Consequently, the base board need not be equipped with a louvre.

There is a great deal yet to learn about the diffusion of air in the room. Equipment for effecting the heating and circulation is refined now to a pretty good point and can be furnished in the various sizes needed for equipment. The point of greatest concern in engineering now, I believe, should be in the effecting of correct distribution. Register companies are cooperating in excellent fashion to gain this data for the air conditioning industry.

Another point which can almost be termed a headache that you have brought out in this letter is that fact

that a great volume of air is handled during the summer months and the duct work must be designed for that. Then during the winter months a small volume of air is handled and you do not get the correct diffusion of the air through these larger grilles. Perhaps it would be possible in this building to split the supply duct of air into the room, so that a good portion of the area could be closed off during the winter months or heating season.

Certainly in this building of all buildings, it would be well to oversize the filter bank. By that I mean, design it for a very slow velocity of air moving through the filters themselves. The ordinary residence type filter is efficient as you know, but it has its limitations. It can be greatly improved in operation by reducing the velocity of air travel through it. One point in favor of this type of filter is that of its long usefulness. The filters that are more efficient require more frequent cleaning. It is difficult to impress upon the customer the importance of cleaning these more efficient filters.

Quite frankly, if you control the distribution of the inlet air supply through a duct system in which there is installed adequate damper control, it would seem possible to vent the air into this chamber or attic space without having it connected directly to the blower equipment. In such a manner it would be possible to run a supply duct from the attic space down to the blower that handles the air necessary for winter heating. This would greatly simplify the installation and I believe prove entirely satisfactory.

◆

Suggestions by G. A. Voorhees, Century Heating Service Indianapolis

For a small, or moderate size residence, I don't like this arrangement when, as in this case, the infiltration of outdoor air through the structure of the building needs to be avoided.

I have had better success in small buildings of this kind by bringing the supply air in through a blower which will develop sufficient pressure within the building to force room air out through the vent flues.

Theoretically of course, the supply and exhaust fan can be so adjusted that a slight pressure will be maintained within the building. But for the job in question, where the incoming air is to be filtered, there is always the danger that gradual accumulation of dust in the filters may pass unnoticed and the actual capacity of the supply blower will thus be reduced.

The net result then would be that the exhaust fan would be removing air from the building at a higher rate than the supply blower is introducing it. Consequently, infiltration of unfiltered air would be increased.

Where there is as great a difference between summer and winter C.F.M. requirements as in this case, if high sidewall supply registers are used, some of them should be shut off tightly during the heating season; otherwise the sharp reduction in the volume of air discharge will result in extremely low register velocity. Hence, if all of the supply registers are used in winter, the register velocities will be so low that (for high sidewall location) the warm air will tend to drift up to the ceiling instead of setting up a turbulence in the room air such as would insure reasonably uniform heat distribution.

◆

Suggestions by Well Known Engineers

We have talked over your proposition with Bruce McLouth of Dail Steel Products, Lansing, Michigan; Homer Brundage of the Brundage Fan Company, Kalamazoo; Fred Bishop, Engineer of Detroit; J. H. Van Alsburg of Hart & Cooley Co., Holland, Michigan. All four men are agreed that the system you propose is practicable and will operate satisfactorily, providing you handle the distribution of air in a correct and proper manner.

These four men seem to feel that there is grave danger of introducing air and exhausting the same air through sections of some of the rooms without creating any disturbance or ventilating other parts of the same room. In their opinion, several supply registers will be required with especial care given to register velocity in order that circulation will be uniform throughout each room.

In their opinion, there should be no particular difficulty with winter heating, except that you likely will have very low velocity and will have to depend upon air diffusion for uniform room temperature.

Home of Tomorrow

(*Continued from page* 50)

The flow of water to the humidifier is controlled by a magnet valve and the coil of this magnet valve is placed in series with the humidistat and control switch located in the hall of the house. The humidity can be controlled to any desired value by adjusting the humidistat in the hall and can be disconnected at will.

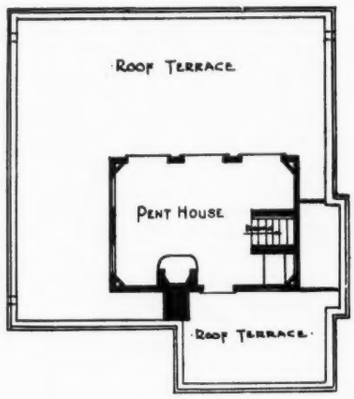
Heating

The blower which forces air through the heating coils operates continuously when heating is required. The house thermostat functions to determine whether the blower runs at its low speed, or at its high speed, depending upon the demand for heat.

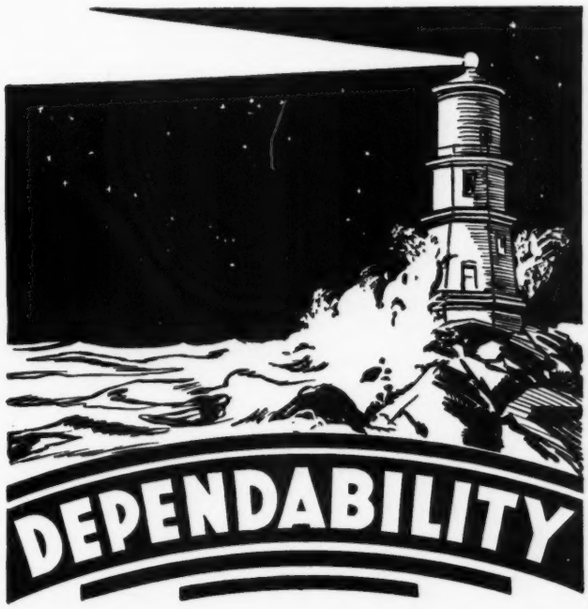
Steam for the heating coils is provided by an oil burner used with a steam boiler capable of supplying 150,000 B.t.u.'s per hour with 5 pounds steam pressure.

In this particular installation, the oil burner is under control of a pressure regulator which maintains a steam pressure of constant value. An automatic steam control valve is used to regulate the amount of steam entering the heating coils. Action of the oil burner is independent of the immediate action of the house thermostat. There is therefore no time lag in the house temperature.

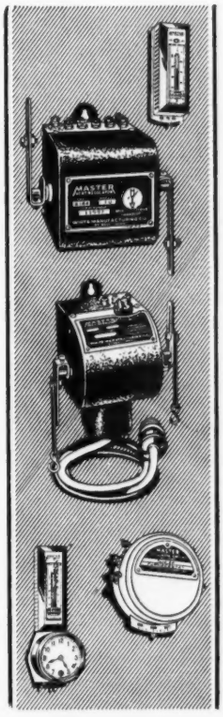
The admission of steam to the heating coils of the air conditioning unit, is controlled by a 2-inch automatic steam control valve, with two control bulbs. One of these bulbs is exposed to the outside air, and the other is on the air outlet of the steam heating coil. This differential control was arranged so that with 0° F. outside, the leaving air temperature was 140° F. and with 65° F. outside the leaving air temperature was 75° F. This arrangement prevents over heating in mild weather, and of course gives a graduation of differential temperatures between these two points for intermediate outside temperatures. If we had made the bulb so that the leaving air temperature was 75° with 30° or 35° outside, the 75° air would not be warm enough for heating the house in this cold weather.



The third floor is a single room pent house, with large glass areas, flat roof above and flat decks alongside.



Human lives would often be lost were it not for the dependability of this faithful beacon that flashes its warning signal exactly on the second every night of every year.



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EVAPORATING PAN IS OVERSIZE. Total evaporating area is 195 square inches, insuring ample humidity under all conditions. Rate of evaporation easily adjusted by raising or lowerng outlet slide at back of furnace. Valve also adjustable.

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Rate of Heat Output Varies

With this arrangement, the temperature of the air leaving the conditioning unit will increase as the outside temperature decreases and more heat is actually required to warm the house. Overheating in warm or mild weather by the continuous operation of the fan will not occur because the leaving air temperature decreases as the outside temperature increases.

Strapped to the steam supply pipe near the inlet side of the steam control valve is a thermostat so connected that the fan cannot run unless the contact of the aquastat is closed. The function of the aquastat is to prevent the fan starting and blowing cold air through the house.

True "Average" Temperature Obtained

The amount of heating and cooling is under control of room thermostats. There are three of these thermostats and they are of special construction in that each thermostat unit itself is located in the room, but a remote control bulb is connected to the thermostat by a small copper tube.

The conventional method of controlling the house temperature utilizes a thermostat located as centrally in the house as possible. The most that any thermostat can do is to maintain the temperature constant in the region immediate to the thermostat itself.

One of the thermostats is located in the hall and is used for the fan speed control during the heating season. The other two thermostats are used for cooling control in the summer time, one being located in the living room, and used when the living room and dining room are being cooled. The other cooling thermostat is located in the northeast bedroom and used when the bedrooms are being cooled. The bulbs of these three thermostats are located in the return air ducts as shown in Fig. 3.

In winter heating the oil burner maintains a constant steam pressure, the automatic steam valve regulates the flow of steam to the heating coils, and the fan will run continuously at low speed until the hall thermostat calls for heat when the fan operates on high speed.

The control bulb of the heating thermostat is located in the return air duct in such a manner that the return air from all of the rooms passes over the bulb. The control bulb for the living room thermostat is located in the return air duct so that the return air from the living room and dining room return ducts passes over the bulb. The control bulb for the bed rooms is located in the bedroom return air ducts so that the return air from all of the three bed rooms passes over the control bulb.

Each thermostat, of course, actually functions to regulate the temperature of the air at the physical location of its control bulb and that is the temperature of the air in the return air ducts. However, in each case, the setting of the temperature to be controlled is performed at the thermostat itself which is located as described above. Thus the occupant of the house, during the heating season, can adjust the average house temperature to any desired value by adiustment of the thermostat

setting in the hall. What he is really adjusting is the temperature of the air in the recirculated air ducts from all of the rooms.

Summer Cooling Control

The control of the cooling equipment in summer is very simple. Let us assume that the basement control switch is turned to the position marked "Living Room or Bedrooms," and that the hall selector switch is turned to the Living Room position. All of the electrically operated dampers, except those in the supply and return ducts from the Living Room and Dining Room will then be automatically closed.

The blower in the air conditioning unit, and the refrigerating equipment will then be completely controlled from the two snap switches and the thermostat in the living room. If cooling and air circulation is desired, the right hand switch is closed, causing the fan to operate continuously and to circulate approximately 900 c.f.m. of air to the Dining Room and Living Room. At the same time, the refrigerating equipment for cooling the air supplied to the rooms is under complete automatic control of the thermostat which functions to start and stop the compressor motor.

If air circulation without cooling is desired, this can be obtained by opening the right hand switch and closing the left hand switch when the fan will operate continuously to supply approximately 900 c.f.m. of air, but the refrigerating equipment will be disconnected.

If the user now wishes to retire for the evening to a cool bedroom, he turns the cooling selector switch in the hall, to the Bedroom position. The electrically operated dampers then function to open the ducts to the three bedrooms and to close the ducts to the rest of the house. The living room control station switches are rendered inoperative, the control being transferred to a similar pair of switches and thermostat located in the main bedroom.

In case it is desired to cool the entire house, as much as the limited refrigerating capacity will permit, the basement control switch is turned to the third position marked "Summer Cooling—Entire House." This causes the following operation to occur:

1. All six electrically operated dampers are opened, thus opening the ducts to all the rooms.
2. The blower, when running, operates at a high speed supplying approximately 2000-2300 c.f.m. of air per minute to the entire house. This arrangement has the double advantage of supplying increased air circulation when it is most needed for comfort, and also increasing the sensible heat removal capacity of the refrigerating equipment (the latent heat removal capacity or dehumidification of course, being reduced).
3. The blower and the refrigerating equipment can be entirely controlled either from the Living Room control station or the Bedroom control station, by setting the Hall Selector Switch to the desired position.

Pressure Losses in Rectangular Elbows

(*Continued from page* 44)

friction curves are based on a coefficient of friction which is equivalent to one velocity-head loss in 55 diameters of a 12-in. square duct and which varies inversely as the $\frac{1}{7}$ power of the size (linear). Some of the elbows tested to show the effect of size on the pressure loss are shown in Fig. 12.

Effect of Velocity

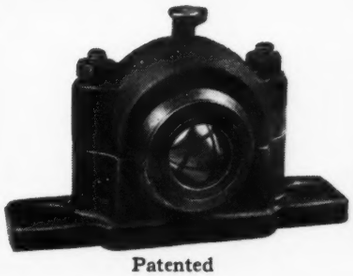
The effect of velocity on pressure loss in elbows depends to some extent upon the relative proportions of shock and duct-friction losses. In no case is it a large factor for the velocities used in air-conditioning work. The range of velocity covered in the tests reported in this paper is from 1800 to 4000 f.p.m. with the majority of the tests being conducted with velocities between 1800 and 2400 f.p.m. The results of the tests are all plotted on the basis of 1800 f.p.m.

In order to differentiate between possible variation of loss with kind of elbow, careful tests were run at velocities between 1800 and 3800 f.p.m. on (1) a 3-in. $\times$ 12-in. elbow with a radius ratio of 0.5 (zero curve ratio) and an aspect ratio of 4, representing high shock loss, and (2) a 3-in. $\times$ 12-in. elbow with a radius ratio of 3 (0.71 curve ratio) and an aspect ratio of 0.25, representing high duct friction. The first elbow showed a pressure loss which varied as $V^{1.92}$ while the second showed a loss which varied as $V^{1.76}$. During tests on a 6-in. $\times$ 6-in. straight duct alone the loss varied as $V^{1.81}$.

Uneven Air Flow

The effect of uneven distribution of velocity across a duct preceding an elbow has a marked bearing upon the elbow loss. If the velocity is high along the inside radius, or throat side, the loss will be higher than normal, and, conversely, if the velocity is high along the outside, or the side adjacent to the long radius, the loss will be lower. Moreover, if the elbow discharges directly into the air, the variation due to velocity distribution will be more pronounced than if the elbow be followed by a straight section of duct. This principle is of importance in the study of double elbows and helps to explain why 180-deg. bends have less loss than two-90-deg. elbows. A further application of these data is in estimating the effect of an elbow placed directly on the outlet of a fan. Usually the velocity of air leaving a fan is highest along the outside of the scroll. In such cases, if the throat side of the elbow is adjacent to the scroll, the loss will be high and may be twice the normal value. For side turns away from a fan outlet, the loss usually will be governed by the side of the outlet where the higher velocity occurs. With single-inlet parallel-blade fans, the region in which the higher velocity occurs will generally be on the backplate side of the fan. On the other hand, in conical-blade fans or fans with inlet guide vanes, the higher velocity may exist near the center or on the inlet side.

[To be concluded]



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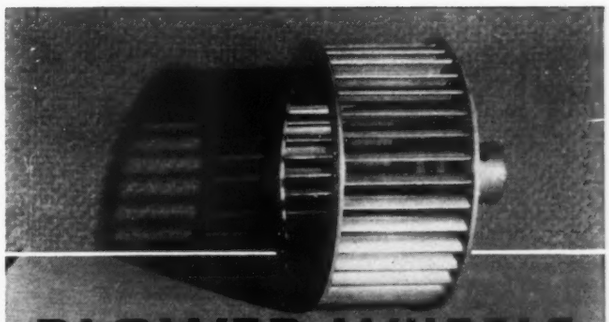

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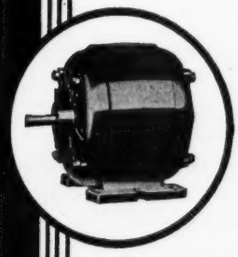

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Konzo Forced Air Facts

(*Continued from page* 41)

A large number of comparisons could be made from this Table, but in most cases they are obvious and of rather limited interest. Hence this discussion is confined to those of more general interest. All comparisons are based on the bright tin surface, drum No. 1.

The following conclusions may be drawn:

Part A Metallic Surfaces

(1) The relative efficiency of a galvanized iron duct is practically the same as that of a bright tin duct. (Drum numbers 1, 7, and 8.) In forced-air duct systems the use of galvanized iron ducts rather than tin ducts is recommended, primarily on account of the durability of the galvanized iron when exposed to humid air both summer and winter.

(2) In the case of uninsulated metal surfaces transmitting heat to air, the character of the surface finish is a major factor in determining the heat transferred, bright metal surfaces transmitting less heat than rusty metals or painted surfaces. (Table I, part A.)

In the cases of drums Nos. 36 and 40 it is shown that the dulling or tarnishing of originally bright metal surfaces, usual results of age, produces only a slight increase in rate of emission of heat as long as no rust or similar spots are present.

(3) The accumulation of dust and dirt on a bright tin pipe increased the heat loss approximately 10 per cent. (See Drum numbers 1 and 1a.)

(4) The fact that pipes are partly protected from convection currents of air by joists and studding does not greatly affect the loss. (See Drum numbers 14 and 14a.) Therefore, in estimating temperature drop of air from bonnet to register, the entire length of duct should be considered and not merely the length of the basement leader.

Part B Non-Metallic Surfaces

(5) Bright metal surfaces are relatively more efficient than painted surfaces. (See Drum numbers 37 and 41.) Therefore, if ducts are to be painted they should be covered with aluminum paint rather than ordinary non-metallic paints.

(6) In the case of uninsulated metal surfaces transmitting heat to air, the nature of the metal and thickness of the wall may bear little or no relation to the heat transferred. (See Drum, 37 and 43.)

These two cylinders had exactly the same surface finish, flat grey paint, but one was made of copper 0.0126 in. in thickness, while the other was made of cast iron 0.25 in. in thickness. The walls of the cast iron cylinder were 20 times as thick as those of the copper cylinder, and copper has a conductivity approximately 8 times that of cast iron per inch of thickness. Hence from the standpoint of the transfer through the metal alone, the copper was 160 times as effective as a heat conductor as the cast iron wall. Notwithstanding this fact, the actual overall heat transfer was the same for both. This is explained by the fact that where heat is transferred from a metal surface to a gas, like air, the surface resistance

TABLE I

HEAT EMISSION FROM VARIOUS SURFACES

**Relative efficiency as an insulator compared with bright tin.*

Part A. Metallic Surfaces

Drum No.	Description of Surface	Coefficient of Emission, K	Relative Efficiency Per cent
	a. Loss same as tin.		
1	IC tin, not insulated, bright	1.280	100.0
7	IC tin nickel plated and polished	1.330	96.0
8	Galvanized iron, No. 28 U.S.S. gage	1.330	96.0
	b. Loss increased 10 per cent. (apx.)		
40	IC tin dull with age, no rust spots present	1.40	91.5
41	Copper, No. 28 gage, clean new surface	1.41	91.0
1a	Same as drum No. 1 with ash dust sifted on 1/16" deep	1.440	89.0
14	IC tin drum No. 4 with paint removed and a housing of compoboard construction, to represent joists, built around same. Housing 8" deep by 14" wide by 28" long	1.430	89.5
14a	Same as No. 14 with housing removed	1.520	84.3
	c. Loss increased 20 per cent. (apx.)		
36	Copper, No. 28 gage, clean, tarnished surface	1.58	81.0
	d. Loss increased 40 per cent. (apx.)		
33	Rusty No. 28 gage black iron painted with aluminum bronze	1.79	71.5
	e. Loss increased 80 per cent. (apx.)		
9	Black iron, No. 28 U.S.S. gage, very rusty	2.370	54.0
42	Cast-iron, 0.25 in. wall, foundry finish	2.21	58.0

Part B. Non-Metallic Surfaces.

Drum No.	Description of Surface	Coefficient of Emission, K	Relative Efficiency Per cent
	a. Loss increased 20 per cent. (apx.)		
11	IC tin (drum No. 1) coated with Bakelite lacquer	1.575	81.5
	b. Loss increased 60 per cent. (apx.)		
29	IC tin with 2 ply 1/4" of smooth concrete	2.08	63.5
20	IC tin with 1 thickness of asbestos paper covered with a firm coating of white calcimine, (for determining the effect of light and dark surfaces)	2.050	62.5
23	Same as drum No. 20 with lampblack calcimine on the surface used in that test	2.120	60.5
28	Black iron, No. 28 U.S.S. gage, painted with dull black Pecora paint	2.20	60.0
	c. Loss increased 80 per cent. (apx.)		
5	IC tin with 1 thickness of asbestos paper and 2 applications of paint, (No. 2 drum with same kind of paint as used on No. 4)	2.155	59.5
4	IC tin with 2 applications of gray paint, (of zinc, linseed oil, and lithpone composition)	2.225	57.5
37	Copper, No. 28 gage, painted dull flat gray	2.42	53.0
43	Cast-iron, 0.25 in. wall, painted dull flat gray	2.43	52.5

Part C. Asbestos Paper Covering.

Drum No.	Description of Surface	Coefficient of Emission, K	Relative Efficiency Per cent
	a. Multiple Layers.		
26	IC tin (drum No. 2) with 8 thicknesses of 12-pound asbestos paper	1.260	101.5
25	IC tin (drum No. 2) with 7 thicknesses of 12-pound asbestos paper	1.320	97.0

Part C. Asbestos Paper Covering.

Drum No.	Description of Surface	Coefficient of Emission, K	Relative Efficiency Per cent
24	IC tin (drum No. 2) with 6 thicknesses of 12-pound asbestos paper	1.390	92.0
22	IC tin (drum No. 2) with 5 thicknesses of 12-pound asbestos paper	1.435	89.0
19	IC tin (drum No. 2) with 4 thicknesses of 12-pound asbestos paper	1.670	76.5
17	IC tin (drum No. 2) with 3 thicknesses of 12-pound asbestos paper	1.790	71.5
	b. Two Layers—Loss increased 25 per cent. (apx.)		
45	IC tin with two layers crimped 9-lb. asbestos paper, tightly wrapped and glued at edges only	1.58	81.0
47	IC tin with two layers plain 10-lb. asbestos paper, first layer glued to surface, second layer tightly wrapped and glued at edges only	1.67	76.5
	b1. Two-layers—Loss increased 40 per cent. (apx.)		
13	IC tin (drum No. 2) with 1 thickness of 10-lb. asbestos paper and a surface of glaze finish printers' proofing paper	1.800	71.0
16a	Same as No. 16 with ash dust sifted on 1/16" deep	1.820	70.5
16	IC tin with 2 thicknesses of 12-pound asbestos paper	1.880	68.1
	c. One Layer—Loss increased 50 per cent. (apx.)		
35	IC tin, one layer of 12-lb. asbestos paper tightly wrapped and glued at edges only	1.90	67.5
44	IC tin with one layer crimped 9-lb. asbestos paper wrapped and glued at edges only	1.92	66.5
46	IC tin with one layer plain 10-lb. asbestos paper, glued tight to surface	2.07	62.0
2	IC tin with 1 thickness of 10-lb. asbestos paper	2.080	61.5

Part D. Insulating Materials.

Drum No.	Description of Surface	Coefficient of Emission, K	Relative Efficiency Per cent
	a. Loss Reduced to one-fourth. (apx.)		
21	Galvanized iron (drum No. 8) with 1-1/4" Asbestocel blocks covered with 1/2" of asbestos cement and a cheesecloth wrapper	0.326	392.0
	b. Loss reduced to one-half. (apx.)		
34	IC tin with one inch cork	0.53	241.0
3	IC tin with 3 thicknesses of air-cell asbestos and 1 thickness of 10-pound asbestos paper	0.565	226.0
18	Galvanized iron (drum No. 8) with 3 thicknesses of air-cell asbestos and 1 of 12-pound paper	0.577	222.0
12	Same as drum No. 10 (see below) but with vents stopped	0.593	216.0
32	IC tin with one inch Improved Asbestocel	0.61	210.0
27	IC tin with 3 ply 1/8" Carocel paper	0.70	188.5
38	IC tin with one-half inch balsam wool, wrapped not pasted	0.68	188.0
39	IC tin with one inch Silimil	0.69	186.0
10	Surface and drum No. 3 with IX tin casing surrounding, with 5/16" air-space and with 6-1/2" vent holes cut in the casing	0.700	183.0
	c. Loss reduced to two-thirds. (apx.)		
6	IC tin with 1 thickness of air-cell asbestos and 1 thickness of 10-pound asbestos paper, (No. 3 drum used)	0.870	147.0

30	IC tin with 2 ply 1/8" Carocel paper	0.90	146.5
15	Same as No. 10 but with the airspace packed with dry JM asbestos cement	0.899	142.0
	d. Loss same as tin. (apx.)		
31	IC tin with single ply Carocel paper	1.12	117.8

is many times the resistance of the metal path. Where the resistance of the metal is such a small portion of the total resistance, either the conductivity or the thickness of the metal, or both, may be greatly increased without appreciably affecting the total resistance, or the overall heat transfer.

Hence, in the case of a furnace with gas on one side and air on the other, it is evident that the nature of the metal, and within reasonable limits the thickness of the metal, has no particular bearing on the heat transfer.

Part C Asbestos Paper Covering

(7) Thin layers of insulation placed on bright metal surfaces transmitting heat to air may result in increasing the heat transferred.

(8) One layer of asbestos paper on a bright tin duct increases the heat transfer approximately 50 per cent. Two layers increase the loss from 25 to 40 per cent, depending on the method of application.

Part D Insulating Materials

(9) Proper insulation of warm air ducts and stacks require the equivalent of at least ¼ in. of good insulation.

(10) The use of 1¼ in. thickness of asbestocel blocks covered with ½ in. of asbestos cement and a cheesecloth wrapper will reduce the heat loss to approximately one fourth the value of an uninsulated bright tin duct. (See Drum number 21 and Fig. 4.)

(11) Insulating materials are available which will reduce the heat loss approximately one-half. (See Drums listed under section b, in Table 1-D. See also Fig. 4.)

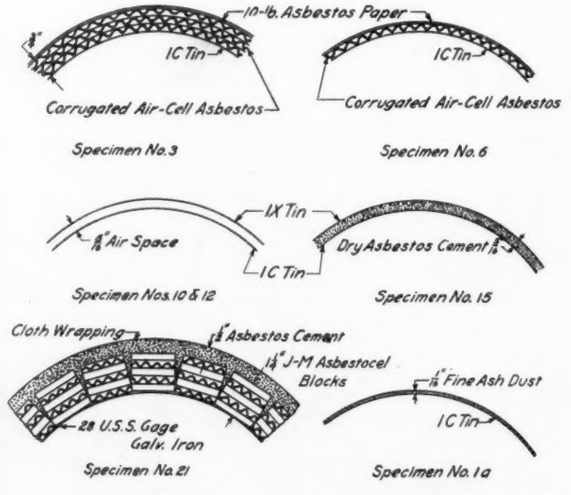

Fig. 4—Sections showing construction of some of the complex surface coverings. (See Table 1, Part D, insulating materials.)

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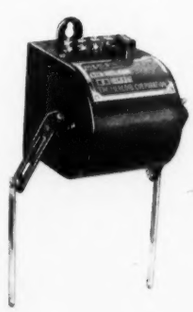

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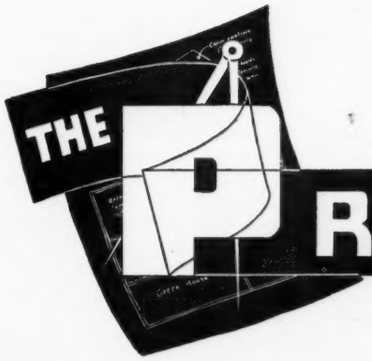


THE PROBLEM CORNER

Coefficients

American Artisan:

In studying your book "Forced Air Heating" I have been unable to learn how the author arrived at the following Heat Transmission Coefficients:

	Author	1935 Guide
Exposed walls for ½" insulation	.152	.19
Ceiling—no floor	.143	.35
Windows (Glass)	1.2	1.13
Concrete floor	.556	...

I wish you would explain to me where these can be found in the 1935 guide, or tell me how the author arrived at these values.

H. G. O., Michigan.

Reply by the Editors

We believe you will find the heat loss coefficients used in our book "Forced Air Heating," were taken from the A. S. H. V. E. Guide up to and including the 1934 issue. In the 1935 Guide, changes were made in many of the coefficients as a result of the tests conducted by Professor Rowley at the University of Minnesota.

The National Warm Air Heating and Air Conditioning Association is still recommending use of coefficients in the older issues of the Guide.

If you have a copy of the 1935 Guide, we see no reason why you should not use the coefficients suggested in it as there is no difference in most of the types of construction and you cannot go far wrong with either of the coefficients.

▼

Grate Area

American Artisan:

Please advise where I can get information or instructions for figuring grate surface on steam or hot water boilers and warm air furnaces.

D. I. H., Penna.

Reply by The Editors

In answer to your letter on grate area for steam or hot water boilers, as well as furnaces, we presume that you wish the operating grate area in order to arrive at the capacity of the units.

If the furnace or boiler is round in shape, measure the diameter at the point of the greatest width. Square the diameter and multiply the result by .7854. This will give you the square inches of grate area. Divide by 144 to get the number of square feet.

If the grate is rectangular, multiply the length by the width to get the square inches of area and divide by 144 to get square feet.

You understand, of course, that the grate area is not a true indication of furnace capacity, as the area of prime and secondary heating surface speed of air through casing, casing diameter, bonnets, pipe area all have very much to do with the ultimate capacity. We suggest, therefore, that if you wish to establish furnace or boiler capacity, you consult the manufacturer who should have these ratings established by laboratory test.

Humidifier "Snow"

American Artisan:

I have just read C. J. Kuenhold's answer to S. C., Michigan, on "Lime Deposits" in the "Problem Corner," page 76 of August issue of Artisan. Mr. Kuenhold did not explain how to overcome this problem—he said it was a bad condition and I agree.

I had this trouble— in fact I threw "snow" all over the house.

This lime is present in cold water. I had my spray supply coming from the cold water pipe.

The first thing I did was to change my supply of water from the cold water pipe to the hot water pipe. I was surprised, when several days later the owner's wife phoned that it was still "snowing" a little. A temperature reading showed that my plenum temperature was 195 degrees, while the hot water tank never reached a higher temperature than 175 degrees. I changed my pulley on the blower motor one size larger and reduced the plenum temperature to 160 degrees. Two winters have passed now and not a flake of "snow" so my answer is this: Let the hot water tank catch all the deposit by heating the water hotter than the plenum temperature and thereby putting the "snow" inside the plumber's tank and not on the furniture.

Arthur W. Hunt,
Kansas City, Mo.

Voorhees Leakage Loss

American Artisan:

In your March, 1936, issue of American Artisan, in the article by G. A. Voorhees on converting gravity systems, will you please explain where you get 2016 for leakage loss, on your sample data sheet?

L. T., Ohio.

Reply by The Editors

The figure 2016 for leakage loss on the March sample data sheet is arrived at by obtaining the cubic content of the room (14 x 12 x 8), which gives 1,344 cubic feet. Infiltration is determined as 1½ air changes per hour, which gives 2016 C. F. H.

◆

Linen "Roof"

American Artisan:

Would like information concerning the repairing of a linen roof that has been on for 10 years, has been painted several times and still leaks, but linen seems to be in good condition. Would white lead and oil, as a paint or paste applied work all right, or what would you suggest? I have had very little experience on a roof of this kind and would greatly appreciate any information you might offer on repairing and putting on a linen roof.

R. E. G., Penna.

Reply by The Editors

Various roofers in Chicago do not seem to be familiar with what you term a linen roof. The Rubberoid Company says that there is a canvas roof which is generally applied by coating the old roof with white lead, laying the new canvas in the lead and coating the outside surface with more white lead and oil.

Frank Starr applied a canvas duck roof on some of the Chicago World's Fair buildings and followed the same practice as outlined above by Rubberoid.

If the roof you refer to is what we know out here as canvas deck, the general practice is to lay the canvas in white lead and cover the exterior with more white lead or with asphalt or pitch.

The Problem Corner . . . . .

Cooling Job

American Artisan,

Gentlemen:

May we have a little more information from Mr. Pehl on the cooling job described in the May, 1936, issue of The Artisan?

We would like to see the basement pipings, CFM delivered to each room and the velocity at the register.

It appears that baseboard registers were used. Were special deflectors installed to direct the air? Were drafts noticeable in any of the rooms? What was the difference in temperature between the breathing line and the floor?

Where are the registers located in the living room and library?

The first floor plan shows four return air faces, but the article states that only two were used—which two?

Are we to understand that the return air intakes are simply cut in the floor with no duct attached and that the air simply spills through these intakes into the basement?

What happens when someone forgets to close the basement door?

F. H. G., Nebraska.

Reply by M. W. Pehl, Author

With reference to the letter addressed to the American Artisan, regarding cooling of the residence as described in the Artisan in May, 1936.

The basement pipes were not changed from the original installation for heating. These are the conventional bright tin furnace pipes of 8", 10" and 12" size. CFM to each room was checked at the time and the velocity at the registers, but these records were not kept and consequently the figures are not available.

Baseboard registers were used in most of the rooms and these were equipped with deflectors. No noticeable drafts could be detected in any of the rooms and little temperature difference was found between the floor and breathing level on the first floor.

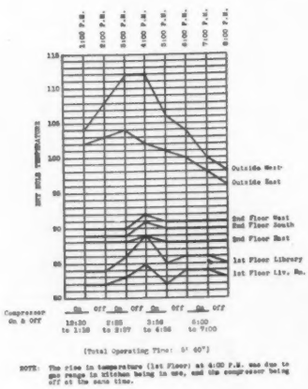
Register in living room and library is a large floor type located to the left of the fireplace in the living room; this register supplied both rooms.

The first floor shows only two return air registers, one in the corner of the hall and the other in the library floor.

The return air intakes were cut in the floor and the air spills into the basement through these registers. No ducts connect to the air intake of the cooling unit. This was just as the furnace contractor had left the job.

If someone should happen to leave the basement door open, naturally the outside air will be drawn into the basement and the efficiency of the cooling unit will be reduced to this extent. However, this is a splendid idea, and this summer I shall try out this scheme and see what happens to the temperature conditions on the first and second floors.

In the installation of this unit, we wanted to see if it was practical to take the standard type of cast iron, warm air furnace and install a cooling unit without changing a single pipe, register, fan or pulley. This we did with the results as outlined.



NOTE: The rise in temperature (1st Floor) at 4:00 P.M. was due to gas range in kitchen being in use, and the compressor being off at the same time.

◆

Throat Size

American Artisan:

The December, 1932, issue of Furnace and Sheet Metals (published by American Artisan) there was an article entitled "Forced Air Heating Data," written by Fred R. Bishop.

I have studied this data carefully and have laid out probably twenty jobs. now I am about to complete a residence job in a three story building.

I am anxious to clear up one point in connection with the duct design.

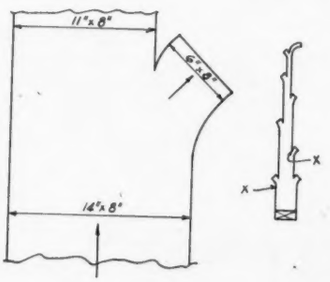
How do you figure out the size of fitting at X in diagram attached?

The sketch does not convey to me clearly if you widen and increase the trunk area at the branch take-off or if you restrict the branch where it joins the trunk.

Using the Friction Chart and laying out the job to equal friction, the trunk naturally is smaller than the total of the branches, and what worries me is how to design the trunk and branch at this take-off point.

I understand the B.T.U. method.

H. C. S., Calif.



Reply by Fred R. Bishop

Enclosed is a sketch showing how these are taken off the side depending on the angle of the turn. The area of the branch opening from the trunk should equal the area of the branch even though the trunk line is reduced less than the area of the branch.

*

Insulation Coefficient

American Artisan:

Can you give me a value for a mica insulating material by which to figure the heat loss, etc.? This material is in a granulated form, having been heat treated or otherwise to expand the layers of mica and slightly separate them.

Also, can you advise where to purchase mica in sheets?

C. L. T., Iowa.

Reply by The Editors

We believe that the blown mica insulating material you refer to is similar to the product sold by several mail order houses and D. t. u's., and manufactured in varying forms by most of the insulation manufacturers.

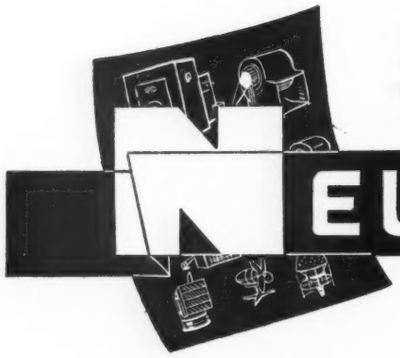
According to insulating tables, this material has a coefficient of heat transmission equal to 0.26 per 1 in. depth.

Manufacturers recommend this material to be placed at least 3 in. thick above ceilings resulting in a coefficient of transmission of approximately 0.07.

We suggest that you order your mica sheets through your local hardware jobber.

AMERICAN ARTISAN'S

5th Annual Directory Number is now being prepared and will be ready for distribution in January . . . . The 1937 edition will contain complete, up-to-date listings of all products used in warm air heating, residential air conditioning and sheet metal contracting work, with names of their manufacturers, trade names and full addresses . . . . It will be bound in a special, heavy cover to withstand the wear and tear of reference to it throughout the year . . . . Dealers, contractors and wholesalers will find it answers every question of "who makes it" and "where are they located" . . . . That is why leading manufacturers already have this January Directory Number on their advertising schedules for full presentations of their lines . . . . No increase in rates over regular issue . . . . Reservations are now being accepted.



For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 99 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1936 Directory

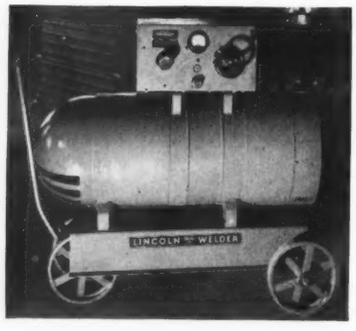
△ Indicates product and manufacturer not listed in 1936 Directory

NEW PRODUCTS

112—Shield Arc SAE

The Lincoln Electric Company, Cleveland, Ohio, announces a new line of single operator arc welders.

These new welders will be known as the "Shield Arc SAE" and will supersede the present type of "Shield Arc."



The predominating feature of this welder is a new method of arc control which makes possible the adjustment of both arc heat and arc penetration in a continuous sequence of fine increments. It is claimed this continuous dual control assures absolute uniformity of performance at every control setting and adds greatly to the successful operation of arc welding.

The new "Shield Arc SAE" welders are available in the following types and ratings:

A. C. Motor driven—200, 300, 400 and 600 Amperes.

D. C. Motor driven—300, 400 and 600 Amperes.

Generator for belt or couple service—200, 300, 400 and 600 Amperes.

Engine driven—200, 300 and 400 Amperes.

◆

●△ 113—Steel Bearing Plates

Adjustable Bearing Plate Co., (not inc.), 6625 Delmar Blvd., St. Louis, Mo., announces rigid steel bearing plates which form a continuous support for joists, provide for any stud spacing, lock studs in place, and minimize shrinkage. Inverted, these plates tie studs to slab. Made of 14-gage, U. S. Standard, this construction is said to carry the load of the customary wood plate.

A folder entitled "Air Ducts in a stud partition without cutting the bearing plate—A partition that retains its function after ducts and plumbing have been passed through the plate," gives full description and erection instructions.

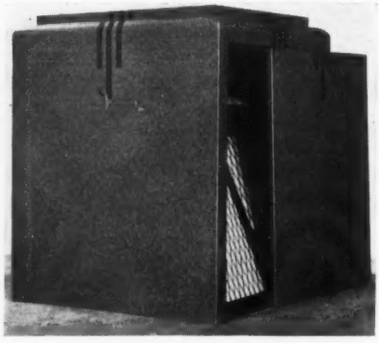
◆

114—Vik-Air Leluxe Conditioner

Viking Air Conditioning Corp., Center & Winslow Sts., Cleveland, announces the VIK-AIR Deluxe 3-speed conditioner, for forced air heating.

The featured Vik-Air three-speed drive is said to give modified air delivery for the mild spring and fall weather; normal volume for severe winter; and materially increased circulation for summer comfort.

Rubber mountings are used—motor, bearings, blower, each separately insulated against vibration. An automatic tightener keeps the belt at the proper



tension at all times. The blower is separate from the casing; the only connection being through a canvas sleeve. The entire blower rests on three-point rubber cushion cups which hold it firmly without lagging.

The "off-center" mounting of the blower outlet is said to cause the air to start a natural spiral which circles the furnace several times.

Velvet enamel, baked on, in forest green or mandarin red, trimmed in black, offers a choice of colors. Dustop renewable oversize filters of oil-coated spun glass rest on angle frames, sealed tight on all sides. Minneapolis-Honeywell Furnacestat is standard equipment.

Five models are available—68,000, 100,000, 130,000, 210,000 and 230,000 Btu.

115—New Nairoil Burner

National Airoil Burner Company, 1327 Girard Avenue, Philadelphia, Penn., announce Model "J" oil burner, available in five sizes for very large homes, apartment houses, churches, business buildings, etc. Nairoil Model "E" is also available in five sizes for homes of five to twenty rooms.

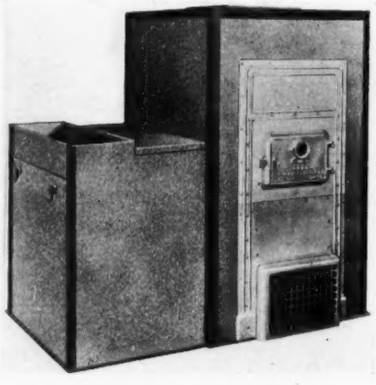
Both models have heavy cast body, frame and tube, together with the new Rota-Roll principle fuel pump, and automatic controls. New literature is available.

◆

116—Air Conditioner

The Fox Furnace Company, Elyria, Ohio, announces a new Sunbeam air conditioning unit for residences and buildings with heating requirements of less than 100,000 B.t.u. The new unit heats, filters, humidifies and circulates the air in winter and provides for increased circulation in summer. It is equipped with a rotary, wall-flame type oil burner completely assembled at the factory with the motors, oil valves, ignition transformer, electric pilots and hearth with duel electric system, ready to be placed in the heating element.

There are two models: The 720-R-10 for basement installations and the 720-R-9 for installation above the basement. The 720-R-9 is especially compact. Blower compartment is under



the smoke pipe to save space. Return air ducts can run under the floor and feed upward into the blower compartment. The 720-R-10 has the blower compartment on the side. Blowers for both models are of the double wheel, double inlet type with a rubber-cushioned, capacitor type motor.

Kinks . . . .

Practical kinks on methods, special equipment, handy ways of doing things are invited. Kinks published will be paid for at the rate of $1.00 for an item without illustration and $2.00 for items with photographs or drawings.—The Editors.

Plywood Patterns for Cutting Metal

As interest in air conditioning grows, and sheet metal installations increase both in number and in importance, it is inevitable that there will be many detailed units constructed of sheet metal that will be standardized by various contractors and shops. Some of these may be items that repeat sufficiently often to make up several in advance of demand. Others will be called for less frequently, though they will possibly be needed at any time. For such units, plywood patterns may logically be prepared and kept at hand to permit of cutting and assembling such a unit quickly, without going through all the preliminaries of layout each time.

The idea is to make the layout on a piece of plywood, and cut it out on the bandsaw or in some other manner, marking the pattern as to what it represents. In patterns developed by the triangulation method, holes can be drilled through the plywood on the lines which indicate various points of bending, to allow of marking through the pattern onto the metal. The outside edge of the pattern can be simply traced onto the metal with a suitable pencil or scriber.

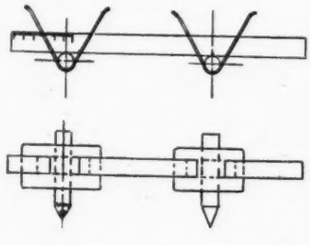
Douglas fir plywood of quarter-inch thickness is very good for the purpose, is available in large flat sheets, and is as reasonable in price as any that can be found.

◆

A Beam Compass

A beam compass or trammel is a handy tool to have around the shop, but not every mechanic can afford to purchase a pair of them. Yet for laying out work of circular shape in large sizes a trammel is absolutely indispensable.

A beam compass which can be made at little or no cost is shown in the accompanying illustration. It consists of a beam (A). This beam can be any length and of steel, aluminum, brass or even maple of a square cross section. Two spring steel clips bent up in "Vee" shape as shown at C, having rectangular slots D cut in them are slid onto



the beam. Trammel points E are then slid between the beam A and the inside of the clips C. If the clips are made of sufficient thickness they will clamp the points E against the beam with sufficient pressure to allow the scribing of any circle within the range of the beam compass.

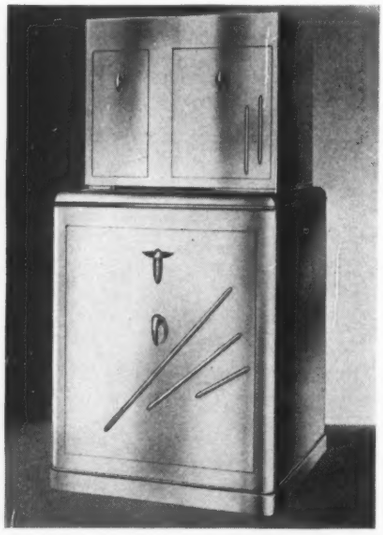
To adjust the trammel point all that is necessary is to take the prongs F between thumb and forefinger, and exert enough pressure so that the trammel E can be slid along the beam. If any additional refinements are desired, a graduated scale can be placed along one side of the beam A, for convenience in making quick adjustments for length.

New Products . . . . . .

117—New Janitrols

Surface Combustion Corporation, Toledo, Ohio, announces a new and improved line of winter air conditioners and gravity heaters—the Janitrols.

Leader of the 1937 Janitrol group is the CF model Janitrol Conditioner



finished in soft opalescent azure, with chrome trim and rounded corners.

All supply lines are hidden so there is nothing to mar the streamlined beauty of the unit. Two filters are enclosed within the unit yet are immediately accessible. These filters are of blown glass impregnated to clean the air of 94 per cent.

An entirely new burner is one of the chief features. Gas is fed from the manifold to a brass pipe. Ports in the pipe are opposite but not connected to the multi-port burners. Thus a large amount of primary air is mixed with the gas which gives the burner its name—Multi-Inspirator. The result is that gas burns with a short sharp flame, ignites, burns and shuts off quietly and eliminates flash-back.

Maximum heat exchange is secured by a series of copper rods with a multiplicity of fins. Within the combustion chamber the rods are encased in cast iron, while the copper fins are outside the chamber, in the direct flow of air from the blower.

The humidifier of the refractory plate type, with four large evaporating surfaces over which spun glass spreads the humidistat-controlled water flow in a thin film.

Controls of the new conditioner may be either the customary Janitrol type or a new compensating system which controls heat and circulation in accordance with outdoor as well as indoor temperature.

The conditioner has both asbestos and aluminum foil insulation, is made of 20-gauge furniture steel, and has a self-leveling base. It is made in a wide range of capacities.

118—Air-Conditioning Gas Furnace

The Forest City Foundries Company, 2500 West 27th Street, Cleveland, Ohio, announces a new Niagara Two-Twenty gas air-conditioning furnace, a completely automatic winter air-conditioning system. Exclusive features claimed are: A central combustion chamber provides a means for regulating the amount of gas consumed to requirements. A single set of controls operates all the burners. A thermo-syphon and counter flow system transfers a great volume of heat to warm circulating air. Twin blowers (eight-variable-speed) insure quiet, constant distribution of evenly warmed air. The motor is full capacitor and non-radio interfering.

The company also makes the Niagara Two-Twenty gravity furnace, easily converted into an air-conditioning system by adding the twin blowers, controls and filters.

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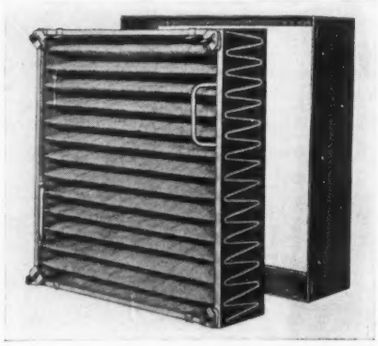


119—New Airmat Filter

American Air Filter Company, Inc., Louisville, Ky., presents the Airmat PL-24 unit—a dry filtering material in a sturdy, compact unit of new design for air conditioning service.

The PL-24 unit is of standard unit construction with interchangeable filter element and frame. The filter element is composed of two matched serrated sections which support the Airmat in deep pleats to provide maximum filtering area and to seal the saw-tooth edges against air leakage. The Airmat material, furnished in rolls, is applied to the filter element by means of a simple loader available in either manual or mechanical type. Each roll contains sufficient material to service 15 units. Either 6-ply or 10-ply Airmat may be used, depending upon the air cleaning requirements of the application. The Airmat PL-24 unit is made in one standard size, 24 in. square by 8⅛ in. deep, rated at 1,000 c.f.m. Its effective filtering surface is 28 square feet and initial resistance .08 in. W. G.

120—Stainless Vapor Pan

Automatic Humidifier Co., Cedar Falls, Iowa, is announcing a new stainless steel vapor pan, which they say is particularly adapted to the conditioned air system, and weighs only seven pounds.

The water level is controlled by simple expansion and contraction of the aluminum tube which is in the jacket of the furnace. When there is no heat, there is no water in the pan. When the heat starts, the drip commences and as the heat increases the drip increases in proportion to the heat.

The pans are made in five sizes.

◆

121—Master Kraft Heating Unit

Harvey-Whipple Incorporated, 55 Emery Street, Springfield, Massachusetts, announces a new Master Kraft conditioned warm air heating unit, of cast iron with a double top radiator, and with furnace and blower enclosed in one casing. A special precast refractory chamber takes the gun type burner.

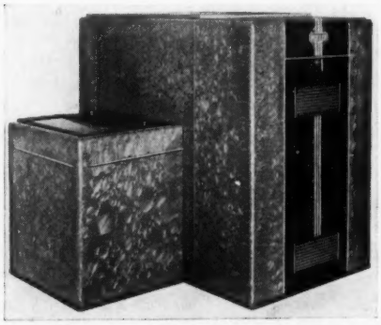
The Master Kraft super safe oil burner furnishes the heating in all Master Kraft Warm Air Units.

◆

122—Mueller Series Twenty

L. J. Mueller Furnace Company of Milwaukee announces the Series Twenty, a new oil-fired, air-conditioning unit to sell at moderate price.

The Series Twenty consists of furnace, fan, filters and air moistener. It accommodates practically any gun type burner, and is furnished with or without burner. The outer casing or cabinet is completely insulated. An inner casing encloses the heater body, reducing the area and assuring positive impingement of air delivered by the fan upon the heating surface of the body and radiator.



A series of tubes in the extra large radiator provide considerably increased heating surface. The tubes are in two rows, with a vertical baffle plate between the rows, compelling the products of combustion to come in contact with the entire surface of each tube before escaping to the chimney.

The drum is of heavy gauge steel, riveted and welded. Radiator is welded at all joints.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

346—AFCO Air-Stream Unit

American Furnace Company, 2719-31 Delmar Blvd., Saint Louis, Missouri, is distributing Bulletin No. 115-C (replacing No. 115-B). This bulletin illustrates and describes the new AFCO air stream oil burning unit.

◆

347—New Price and Odd Lot List

International Heater Company, 1933 Wentworth Avenue, Chicago, Illinois, is distributing new price lists of International warm air furnaces and air conditioning units (August 25, 1936) and a price and data sheet on the 600 series International Blower.

Another sheet of the same date gives bargain odd stock list with prices.

◆

348—The Round Oak Line

Round Oak Company, Dowagiac, Michigan, is distributing a new folder with details of their furnace and air conditioning line, including exclusive agency plan. The company makes a range of sizes and models for hard coal firing, automatic fuel oil, automatic coal stoker firing, pipeless furnaces and room heaters. The folder shows the complete Round Oak line.

◆

349—Pipe Crimper

Champion Tool Co., 356 West 91st Street, Los Angeles, has prepared a small folder with space for dealer imprint, describing the Champion pipe crimper. The folder is of a size to fit a No. 10 envelope.

The crimper is designed for crimping lap joints in sheet metal pipe, water heater vent, smoke, conductor and warm air furnace pipe on the job.

◆

350—New Lochinvar Furnace Folder

Lochinvar Corporation, 11921 Grand River Avenue, Detroit, is distributing a new folder illustrating and describing their new Model 100-A Lochinvar furnace—a complete air conditioning furnace using oil as the fuel with a multi-stage burner. The Lochinvar is fully automatic and contains within one casing a steel furnace, return air secondary heating surface (tube type) blower and filters.

◆

351—New Perfex Control Catalog

Perfex Controls Company, Milwaukee, Wisconsin, makers of electrical controls, now has available a complete catalog covering the Perfex line of automatic control equipment for heating, air conditioning and refrigeration. The products include thermostats, fan controls, strap on hot water controls, pressure controls, oil burner controls, relays, stoker timers, refrigeration controls, solenoid valves. Each product is shown and completely described.

◆

352—Brauer Catalog—Second Edition

A. G. Brauer Supply Co., 312 North Third St., St. Louis, Missouri, jobbers and wholesalers of repair parts for furnaces, boilers and stoves, is distributing a new and complete catalog—second edition. Replacement parts are priced by list and discount rather than by the pound. The catalog will be mailed to dealers in territories served by the Brauer company.

This company furnishes original parts made by the manufacturer, or from the original patterns purchased in cases where the manufacturer is no longer in business.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

353—Econocol Stoker Booklet

Econocol Stoker Division of Cotta Transmission Corporation, manufacturers of Econocol stokers, Rockford, Illinois, is distributing a profusely illustrated visual sales presentation booklet as a dealer help for the 1936 season.

The booklet presents the complete story of the benefits accruing from the purchase of a stoker (and Econocol in particular). It is 5½x8½ in. in size with plastic binding.

◆

354—Repairs for Hot-Air Furnace

The National Foundry and Furnace Co., Dayton, Ohio, has just published Price List No. 24, size 8 x 10½. A handy chart in the front of the catalog enables the buyer to definitely indicate the type of castings wanted, saving confusion in filling orders and the proper interpretation of them.

The facsimile of the "Chronat" label will appear on all castings, they says, to indicate the new and superior type of alloy iron being used in all repair parts.

◆

355—Pipe and Fittings

Acer & Whedon, Inc., Medina, New York is distributing pamphlet No. 3 on their standard air conditioning pipe and fittings, with patented snap lock. New square pipe trunk line fittings are specially designed to fit flush against the cellar ceiling.

Bruns Metal-Lite Awnings, Inc., 52 Ralph Avenue, Brooklyn, New York, is distributing a folder giving a general description of the Bruns Metal-Lite awning.

Bruns Metal-Lite awnings are made of Anaconda copper and aluminum. In addition to the natural metal, colors may be had to fit any color scheme of decoration. They are made to fit all standard window specifications or to order for special sizes. They perform both the functions of an awning and a blind. The awning raises or lowers, adjusts and locks itself into any desired position by a crank. The louvers fold and nest into each other so that when the awning is completely raised the awning extends only a few inches from the top of the window. The first cost is said to be the last cost as they will not tear, rot, rust, burn or need to be replaced—there is no extra yearly expense or labor for removal, storage or re-installing.

◆

356—Rudy Coal, Oil and Gas Conditioners

The Rudy Furnace Company, Dowagiac, Michigan, is distributing three new pieces of literature—Rudy Coal Heat Air Conditioner, Rudy Gas Heat Air Conditioner, and Rudy Oil Heat Air Conditioner.

The coal heat air conditioner supplies heat, humidity, air filtration and ventilation in winter and dehumidification or positive cooling in summer may be added without changing the installation. Without positive cooling, the coal heat air conditioner supplies air circulation in hot weather.

Rudy Oil Heat Air Conditioners represent, they say, the latest development in the field of 3-season air conditioning. The unit supplies, in addition to automatic heat, the three other basic elements of winter conditioned air—humidity, ventilation and air filtration. Summer cooling may be obtained by operation of the ventilating element, or positive dehumidification and mechanical cooling may be added to the installation.

Rudy Gas Heat Air Conditioner supplies from one central plant the four basic elements of winter conditioned air—heat, humidity, air filtration and ventilation. Dehumidification and mechanical cooling for summer may be added without changing the installation. Operation of the ventilating and filtering unit for summer comfort may be had independent of the heating plant.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

357—All Year Home Comfort

Carrier Engineering Corp., 850 Frelinghuysen Avenue., Newark, N. J., is distributing a small folder with space for dealer imprint entitled "All Year Comfort Brought to Your Home." New developments in air conditioning and automatic heating are illustrated and described.

◆

358—Cir-COOL-ator and Vik Air

Viking Air Conditioning Corp., 1935 Euclid Avenue, Cleveland, Ohio, is distributing two new folders—one covering the Cir-COOL-ator and the advantages of summer air conditioning attained by air circulation, and the other the Vik Air complete winter air conditioner.

◆

359—Osborn Distributes Moncrief

The J. M. & L. A. Osborn Co., 1541 E. 38th St., Cleveland, distributors of Moncrief furnaces and air conditioning systems made by The Henry Furnace and Foundry Co. of Cleveland, is distributing a small leaflet, 3x6 in., illustrating and describing the Series "C" Moncrief and Moncrief "Aristocrat."

◆

360—Ventilation Manual

Ventilation Manual for Sheet Metal Contractors, by Paul R. Jordan, is published by Edwin A. Scott, 45 West 45th Street, New York City. This book is a treatise intended primarily as a guide to those who are called upon to design and install ventilation without aid from owner, architect or engineer. It deals with what might be termed ductless ventilation, the class of work in which propeller fans or roof ventilators are used, with but little or no duct work. It is not intended for the engineer or designer of central systems employing extensive duct work.

The book has been subdivided into six parts. Part one discusses the business angle, pointing out opportunities and making suggestions on how to be successful.

Part two is entitled Physical Factors, treating down drafts, radiant heat, humidity, condensation and gases.

Part three deals with specific problems, including heat conservation, heat removal, cooling with night air, moisture removal, fume removal, ventilation for breathing.

Part four is devoted to equipment. The chapter headings are: Intake, Exhaust, Hoods, Dampers and Dampering, Back Draft Dampers, Fans and Ventilators and the Anemometer.

Part five—Design Data—outlines the general principles of ventilation and explains how to figure ventilation, volume of air, sizes of equipment, etc., with a chapter entitled "Choosing a Ventilator."

These first five parts are written to help the reader get a mastery of the factors encountered and the principles.

Part Six covers "Specific Applications," consisting of 40 chapters in which ventilating methods and layouts are explained and illustrated for as many different kinds of buildings or rooms. In these chapters the air supply for the particular building under consideration is given, with a typical layout or plan of ventilating the particular building or room. It is intended that this section of the book will be especially helpful in that a man who has a specific problem in ventilation, may turn to this chapter and get an explanation of how a building or room for such service should be ventilated and will note in the illustration a typical ventilating system for that service. For example, if he is called upon to ventilate a barber shop he may turn to Chapter 29 and get specific instructions on this problem.

Thus the book is not only a treatise on the general factors and phases of ductless ventilation but also a work on specific problems in ventilation.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

361—The Dailaire System

Dail Steel Products Company, Lansing, Michigan, is distributing a new 16-page catalog covering the Dailaire system of heating, cooling and air conditioning, their stainless steel and 200 series for oil, coal or gas.

Specifications covering their latest changes in the modernization of this producct are included. Each unit is shown in detail and covered with complete characteristics tables.

◆

362—Air Conditioning Instruments and Controls

Julien P. Friez & Sons, Inc., Baltimore St. at Central Ave., Baltimore, Maryland, who this year celebrate sixty years of activity as "The Makers of America's Weather Instruments," is distributing a new publication intended to show the wide application of temperature, humidity and effective temperature controlling, indicating and recording instruments as applied to the varied fields of air conditioning.

◆

363—McDonnell Automatic Water Feeders

McDonnell & Miller, Wrigley Building, Chicago, offers McDonnell automatic boiler water feeders, water feeder-low water cut-off combinations, and individual low water cut-offs, for split system air conditioning jobs.

Their catalog is entitled "Boiler Protection Is Cheaper Than Boiler Repairs!"

The heart of the safety feeder, they say, is the valve mechanism.

◆

364—Carrier Home Conditioning and Heating

Carrier Corporation, 850 Frelinghuysen Ave., Newark, N. J., has just issued a new bulletin on Carrier home air conditioners and Carrier home furnaces. Typical applications, combinations, operation cycles, ratings and capacities, with detailed specifications are included.

The title is "Air Conditioning and Automatic Heating for the Home" by Willis H. Carrier, on the 25th anniversary of his establishment of the art.

◆

365—Fans and Blowers

Ilg Electric Ventilating Co., 2850 N. Crawford Ave., Chicago, Illinois, has recently published a new Ilg fan and blower catalog No. FB-45. This catalog gives a complete coverage of the fan and blower subject. An index appears on the front cover. Among the products shown and described are—motors, fans, blowers, shutters, guards, ventilators. Numerous interesting photographs of manufacturing operations are shown. Complete characteristic and capacity tables are included.

◆

366—The Morse Fuel-Saver Stoker

Morse Chain Company, Fuel-Saver Division, Detroit, Michigan, a Borg-Warner Subsidiary, with factories at Ithaca, N. Y., Detroit, and Letchworth, England, is distributing a new 12-page catalog covering the Morse automatic fuel-saver—a coal stoker which feeds the coal into the fire bed through the bottom, and forces it up through the hot coals until it emerges on the top as—the makers claim—clean, burned out clinkers, with every heat unit extracted. They say the Morse fuel-saver eliminates dust, ashes, smelly gas, and dirty smoke by converting these evils into actual heat.

There is only one size of Morse Fuel Saver with adjustable speed control for various requirements.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

367—Brauer's Want List and Handy Order Pad

A. G. Brauer Supply Co., 316 North Third St., St. Louis, Missouri, is distributing a combination want list and handy order pad. The original order is a postal card requiring no postage. It is addressed. The duplicate is a thin white sheet which remains in the book as the customer's copy of the order. An attached carbon is in the back of the book, ready to be flipped face down on the white sheet.

◆

368—Ilg Catalog and Instruction Book

Ilg Electric Ventilating Co., 2850 N. Crawford Avenue, Chicago, Illinois, is offering copies of the new Ilg air conditioning Catalog No. 436 and instruction book No. 436A.

Catalog No. 436 illustrates and describes the various equipment, while catalog 436A gives simple instructions for estimating Ilg-Kold cooling systems. There are reasons for and rules pertaining to and helpful in planning systems for comfort and health; and also suggestions for installing, operating and servicing air conditioning systems. There is a comfort chart; a psychrometric chart; a static pressure chart; a chart of the refrigeration cycle; solar intensity curves; transmission coefficients for walls, partitions, floors, ceilings and rooms; and problems.

◆

369—Young Damper Regulator

Young Regulator Co., 4500 Euclid Avenue, Cleveland, Ohio, has just issued a new bulletin on the Young Regulator.

The Young regulator indicates the position of a damper regulating the volume of air flow through a duct. They say it is readily set and locked in a permanent position. It is made of rust-resisting metal finished in plain, statuary bronze and nickel plated.

◆

370—Ventilator of Aerodynamic Principle

Marathon Electric Mfg. Corp., Wausau, Wisconsin, is distributing Bulletin 5-36-5M, covering their new ventilator with the new aerodynamic principle.

The ventilator is said to have power to pull air from all corners and deliver a solid compressed mass of air but three-fourths of the propeller size. This nozzled, compressed mass of air is delivered into the accelerator tube in a swirling, whirlwind manner at very high velocity, and expelled even in the face of adverse winds.

A loose leaf binder contains dimension sheets and bulletins on their motors and grinders and buffers.

◆

371—Air Conditioning and Heating for Homes

The Farquhar Furnace Company, Wilmington, Ohio, is distributing a folder illustrating and describing FarQuar Air Conditioning and Heating Systems.

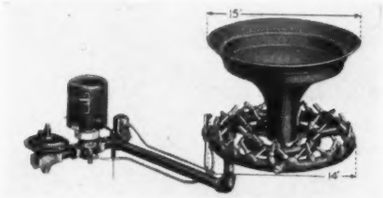
The FarQuar system provides a positive circulation of properly filtered, heated and humidified air to every room at controlled temperatures and rates of flow during the heating season. Features claimed are slow combustion and self-regulator, which holds the fire under automatic control, making for economy and efficiency. They say that you can hold your hand over the smoke pipe while the fire is burning—a slow burning fire makes clinker formation almost unknown, the fuel being entirely reduced to a fine ash.

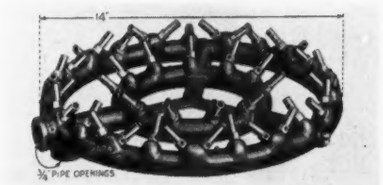
During summer months, the FarQuar air conditioner unit can be opened to circulate air drawn from the basement, cleaned, filtered and distributed throughout the house. A special ash container is provided for quick and easy removal of ashes.

New Products . . . . . .

123—Barber Round Burner Models

The Barber Gas Burner Company, 3704 Superior Ave., Cleveland, has just placed on the market two new conversion burner models for use in round furnaces or boilers having firepots up to and including 20 in. in diameter.





Among the many improvements claimed are higher heating efficiency and greater ease of installation. Special features of construction enable these burners to be correctly installed in the least possible time. Deflection of heat to the sidewalls is accomplished by a semi-steel deflector with deflector ring, which produces a scrubbing action of the flame on the sidewalls, which makes for maximum efficiency as well as economy. These burners require no refractory elements, thereby saving both installation time and replacement.

The burner unit shown is a Barber Burner Unit No. X-44, and the assembly shown (No. X-44-B) includes this unit with all necessary equipment for full automatic control.

These new burners are also furnished for manual control.

◆

● 124—Combination Humidistat and Electric Valve

Supreme Electric Products Corporation, 79 Mt. Hope Ave., Rochester, New York, announces the development of a new unit to simplify humidity control—a combination of a Friez insertion humidistat with a Supreme Electric solenoid water valve.

The humidistat is installed through the wall or casing of the cold air return. The electrical contacts in the instrument operate the electric valve, thus supplying moisture to maintain the humidity at which the pointer is set. Mounting the two units together simplifies the electrical wiring.

The assembly of the valve on the humidistat is easily made by simply attaching the valve to the lower front plate of the humidistat with nipple and locknut as supplied with valve. One lead from valve is attached to one terminal on the humidistat. A short lead wire is supplied to connect the other terminal to one line wire and the other line wire connects to the other lead from the valve coil.

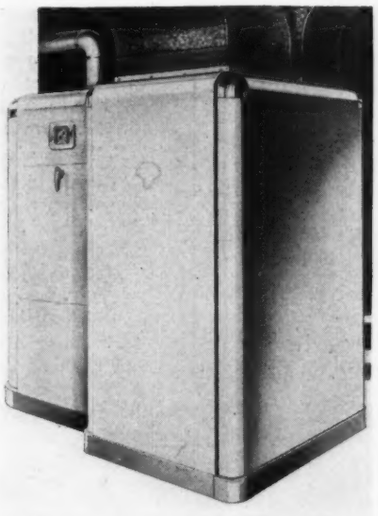
Net weight of the assembled unit is five pounds.

◆

125—Air Conditioner

Fitzgibbons Boiler Co., Inc., 101 Park Avenue, New York City, announces the Fitzgibbonsaire, a floor unit plenum chamber constructed in ten different capacities ranging from 91,300 to 461,000 Btu. The unit contains a filter bank, double inlet blower, spray nozzle humidifier, heat exchanger, and suitable internal piping for connecting to steam supply. Operation is on 5 pounds steam pressure.

The accompanying illustration shows the Fitzgibbonsaire installed with a Fitzgibbons Oil Eighty automatic



boiler. The unit may also be installed with any one of the several types of Fitzgibbons boilers for automatic heat, such as the Coal Eighty Automatic for stokers, and the Gas Eighty for gas burning installations.

The unit is compact and need not be placed directly along side the boiler, but in any location within the home where it is expedient for it to be used, since steam lines can be carried from the boiler to the Fitzgibbonsaire just as easily as they are taken to the radiators.

The domestic hot water supply furnished year around instantaneously and without a storage tank is an additional feature.

◆

126—Electric Soldering Irons

Stanley Tools, New Britain, Conn., is now manufacturing an improved line of electric soldering irons for either A. C. or D. C. current.

The irons have adjustable, ventilated handles which, by means of a lock collar and sleeve, can be adjusted to desired length and rigidly tightened.

These irons have compressed pure copper tips, accurately machined for a valve-fit connection with the heating heads, to assure effective heat con-

duction and to protect metal connecting surfaces from oxidation and flux corrosion. Hermetically sealed heating heads protect the "built-in" windings and solid copper cores from air, flux fumes and moisture.

◆

● 127—Stoker Furnace

Joliet Heating Corporation, Joliet, Illinois, announces Model "E" Deluxe Six-Phase Comfortmaker for stokers.

This model has a modernistic steel casing, provides constant flow of air through the rooms, humidifies and filters through chemically treated filters, all automatically operated. Inlet doors

are provided for introducing basement air when additional cooling is desired.

The heating element consists of an upright welded steel drum with special front which provides a clinker chute. Stoker is inserted from one side.

◆

128—Wholesale Parts and Accessories

Borg Warner Service Parts Company, 2100 Indiana Ave., Chicago, a division of Borg Warner Corporation, is now wholesale distributor for a complete line of parts and accessories used in automatic heating and winter air conditioning. A new catalog is offered to readers of the AMERICAN ARTISAN.

News Items . . . . . .

A. S. H. & V. E. Annual Meeting

The American Society of Heating and Ventilating Engineers will hold their 43rd annual meeting at the Hotel Statler, St. Louis, on January 25 to 27, 1937. The semi-annual meeting will be held at the New Ocean House, Swampscott, Mass., on June 24 to 26, 1937. Officers and members are cordially invited.

◆

Featuring Lennox Aire Flo Line

Chattanooga Blow Pipe and Roofing Co., 1301 Duncan St., Chattanooga, Tennessee, is featuring the Lennox Aire Flo Aire conditioning products. The company is also quite active in the roofing trade with the more vigorous construction season on at Chattanooga. A large number of TVA workers from Knoxville are moving to Chattanooga soon and for them a good many homes are being constructed.

◆

Air Conditioning Systems and Equipment

June statistics released by the Department of Commerce, Bureau of the Census, Washington—William L. Austin, Director—shows that the total value of orders booked by 98 manufacturers during June, 1936, amounted to $4,336,636, as compared with $4,412,681 for May, 1936 a decrease of 1.7 per cent.

◆

Reminding Home Owners

Jack Stowell, 133 Galena Boulevard, Aurora, Illinois, has sent out one of his interesting illustrated letters to home owners, reminding them that their gutters, down spouts, tin roofs, etc., may need repairs for damage occurring during the severe winter. With this letter he enclosed a business reply card offering free inspection without obligation.

◆

Yandell & Conger New A. C. Department

Yandell and Conger, composed of Clyde H. Yandell and R. D. Conger, located at Union Ave. and I. C. R. R., Jackson, Tennessee, developed this season a department of air conditioning, using the Metallation system. It has designing, estimating and installation crews. The firm reports considerable home remodeling work this season.

◆

New Buffalo Dealer

Great Lakes Heating Corporation, 639-641 Michigan Avenue, Buffalo, New York, has recently been formed with T. A. Cunningham as manager. The concern specializes in warm air heating, air conditioning, cooling and ventilating, automatic heat controls, fans and blowers. They deal in sheet metal, do remodeling and guarantee their systems, selling on time payments. Manufacturers are invited to send catalogs and price sheets.

◆

Phillips-Buttorff Open Jackson Branch

Phillips-Buttorff Co., Nashville, Tennessee, pioneers in the stove manufacturing, tin and hardware trade, now have a branch warehouse at Jackson, Tennessee. David Walpole, sheet metal man, in charge operated at Lexington, and McKenzie, Tennessee, in former years. He is a son of the late F. D. Walpole who for many years had a large tin shop at McKenzie, and invented a metal well bucket that attained wide use. The bucket has been manufactured by Phillips-Buttorff Company for many years.

Reports Activity in Blow Pipe Work

Ford Blow Pipe Co., 400 North Main St., Memphis, Tennessee reports work in the blow pipe line for cotton industrials. It has just completed installations for the American Fork & Hoe Co. on Colorado Street.

◆

Arenberg Heads Robert Barclay, Inc.

Milton K. Arenberg, for twenty years associated with Ilg Electric Ventilating Company, Chicago, has resigned his position as Chicago district manager to become president of Robert Barclay, Inc., wholesale distributors of automatic heating and air conditioning accessories. The address is 122 North Peoria Ave., Chicago.

◆

Bedell, New Orleans, Reports Revival

Bedell Structural Steel Works, 3620 Baudin Street, New Orleans, Louisiana, reports many industrial jobs in progress. This firm fabricates and erects steel frames for buildings, frames to mount signs, tanks, etc., and fabricates and erects smokestacks, tanks, towers, breechings, steel girders and other like work.

Robert B. Bedell and Joseph V. Giesemann are owners of the concern, established over 40 years ago.

◆

Home Made Cooling Device

An editorial in a Florida daily gives an account of an Arizona relief worker who devised a home-made air-conditioning outfit, which is proving so practical in homes and small offices when a commercial cooling system can not be afforded that carpenters and other laborers out of work for months have found themselves deluged with demands for their services in its manufacture.

Following is the process given for this simple outfit:

"Build a box out of some insulated material such as compo-board and set it in a window. The back of the box should consist of a thin layer of excelsior or steel shavings, held in place by sections of fine-mesh chicken wire. At the top of the back side, a garden hose drips water down through the excelsior. The house side of the box should be solid except for a circle just the size of the electric fan.

The fan pulls air through the soaked excelsior, cooling it and pushing it into the house. Persons who have the devices declare they can reduce the temperature of two or three rooms 20 degrees below the outside temperature."

◆

From an Old-Time Subscriber

Frederick B. Lotze, of Cincinnati, Ohio, writes some interesting history of early operation in his area. Adolphus Lotze, a sheet metal worker, arrived in this country in 1831 and after spending some five years in the East came to Cincinnati, where he opened a sheet metal roofing and stove business. In 1844, he started the manufacture of his own furnace and engaged in warm air heating. Heating required so large a portion of his time that eventually he dropped the manufacture of tinware and tin roofing. His older son joined him in 1867 and later his second son, the writer of the letter, entered the business. The territory at that time included Southwestern New York, then South to Millidgeville, Georgia, West to New Orleans, North to the West Line of Kansas and East to Madison, Wisconsin, Milwaukee, Detroit and Cleveland.

Adolphus Lotze died in December, 1877. In 1916, the sons closed the business. Mr. Lotze, now 83 years old, states that he still subscribes to AMERICAN ARTISAN and finds his time well filled answering mail orders for repairs, inquiries for overhauling warm air furnaces and other activities made necessary by the momentum of this old established firm."

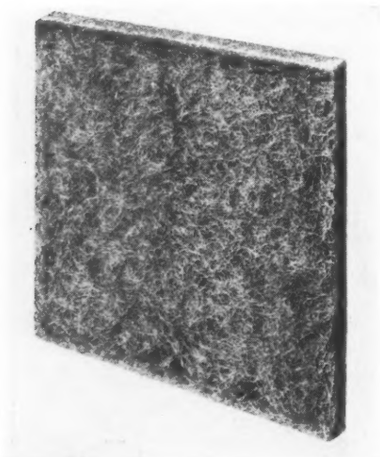
Mr. Lotze was one of the first subscribers to AMERICAN ARTISAN, and we wish him health and happiness.

New Products . . . . . .

129—New Air Filter

The Independent Air Filter Company, Chicago, is marketing a new filter known as the Permo Pad Air Filter. The Permo Pad is a washable, moistureproof and acidproof unit, said to be odorless, sterile and to have an unusually large storage capacity.

The Permo Pad is progressively



packed, the media being loosely formed on the entering air face and densely packed on the exit side, which affords extended usefulness before servicing is required. The unit may be cleaned either by beating or by washing in hot water, steam or naphtha.

The filter is a self-supporting unit, with the added important feature of a flexible edge all around the pad, thus giving it a perfect air seal against edge leakage. It is being marketed in standard sizes ranging from 10x10x2 to 20x30x2 inches, with capacities from 200 cfm. to 1,200 cfm. Initial resistance of a single pad is .09 W. G. For commercial installations, standard ladder type frame units with two Permo Pads in each frame are furnished, overall dimensions being 20x20x6 in. These can be arranged in either straight or "V" type formation.

◆

●△ 130—Coppercote

American Coppercote, Inc., 480 Lexington Avenue, New York, announces Coppercote, a new preservative coating for wood, metal and other surfaces.

They say pure metallic copper of extreme fineness and of the irregular flaky structure known as "dendritic" can now be applied to iron, steel, wood, concrete, or other surfaces which require a protective coating of unusual effectiveness. This new coating is being produced under the name Coppercote and has been tested in the solution of many difficult corrosion problems.

The development of Coppercote involved the production of a special vehicle in which the minute flakes of pure metallic copper remain in perfect suspension. While the coating is applied, a physico-chemical reaction occurs between the particles of copper and its vehicle. Since the copper is "dendritic" in structure rather than granular, a closely knit coating results which, when set, forms a tough, hard metallic surface. When applied to a surface of ferrous metal, the makers say it will positively prevent corrosion. When applied to a surface already rusted, it will arrest any further corrosive action. It will not crack, scale nor chip as a result of the extremes of temperature nor is it affected by the ultra violet rays of the sun.

A turbulent action which takes place when Coppercote is applied causes it to spread itself automatically and to work its way into every pore of the coated surface to which it becomes thoroughly united. The result is a sealed metallic surface permanently impenetrable by either air or moisture and therefore a protection against corrosion. This action throws off every air bubble and closes every pin hole. There occurs a definite stratification of the metallic copper and its vehicle. The copper particles combine and adhere closely to the base while the vehicle rises and forms a second protective film. This phenomenon permits the use of various colors in the vehicle.

Coppercote has been demonstrated to be a non-conductor of electricity. Due to the insulative character of the coating, destructive electrolytic action is impossible.

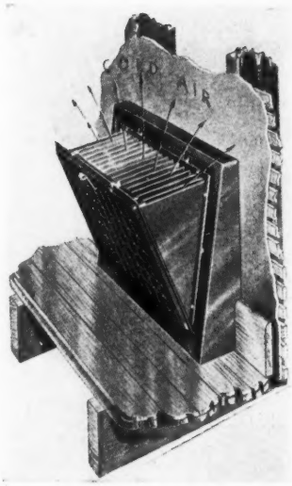
◆

●131—New Corkboard

United Cork Companies have started the erection of a new plant at Kearny, N. J., to manufacture its new, patented process BB (Block Baked) Corkboard.

The new, patented Corkboard is made in blocks, up to 36 in. wide, 40 in. long and in thicknesses of from 1 to 16 in., by a new process of internal application of heat. The heat is applied to the mass of cork in a way that avoids charring and a breaking down of the cork granules themselves. Accordingly, the cork retains much of its natural resiliency, structural strength and has a greater insulating value.

One of its many advantages is its flexibility, in that it can be bent to a considerable extent to conform, without breaking, to cylindrical surfaces thereby avoiding the use of lags on large tanks, air conditioning ducts, etc.



132—All Season Wall Register

Harry L. Eckenroth, 1935 Franklin St., San Francisco, Cal., announces a new air conditioning wall register, made in standard sizes to fit any standard register box. Units are interchangeable with hot air registers of corresponding size on old jobs.

When open for summer cooling, with shutter closed, they direct the cool air towards the ceiling.

In closed position, the shutter is opened for winter heating.

The three-piece construction is said to simplify installation, making for a neat appearance either in open or closed position, and prevents leakage of air between the register and the wall.

The center vane is perpendicular. The others gradually slope each way to a 45-degree angle, thus directing the air flow each way as it leaves the register. ◆

133—Carrier Residential Line

Carrier Engineering Corporation, 850 Frelinghuysen Ave., announces a new residential line comprising an oil burner, boiler-burner units—oil and gas, winter and year 'round air conditioning.

Units are designed so as to be assembled for a large number of combinations. The boiler-burner unit may later have the winter air conditioning sections added. This latter equipment has space for cooling coils that may be inserted when summer air conditioning is decided upon.

The air conditioner is adaptable to existing automatically controlled boilers. Other combinations provide for zone control or split systems. Equipments are available in two sizes suited to large and small houses. Domestic water heating is provided for winter and summer and for use with or without a storage tank.

National distribution will be made this Fall through dealers. National and local advertising will support the sales program. Complete promotional material will be available for dealer training and selling. Dealer franchises are now being allocated.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 99.

372—Humidity and Health

Wisconsin Humidifier Company, Milwaukee, Wisconsin, is distributing a new folder entitled "Humidity Protects Your Family's Health." The Wisconsin Humidifier is a pan type unit for placement in the bonnet, using the heat evaporation principle.

◆

373—Common Sense Ventilation

The Swartwout Company, 18511 Euclid Avenue, Cleveland, announces Bulletin V-100-B just off the press. It is a non-technical bulletin on a more or less technical subject of universal interest. The purpose of this bulletin is to look at industrial and commercial building ventilation from the common sense standpoint in order to arrive at the most logical, the most economical and the most satisfactory solution to any ventilation problem. Drawings, photographs and text show common ventilating problems and their solution.

◆

374—Gas Floor Heater

Heckler Bros., 965 Liberty Avenue, Pittsburgh, Pennsylvania, is distributing a folder describing the Heckler floor gas heater, recommended as an auxiliary heater for storerooms, halls, living rooms of any place where instant heat is needed. The heater is designed for easy installation and for use in late spring and early fall when the main heating system is not in use. A Barber Gas Burner is part of the equipment. The air column, they say, never comes in contact with the gas flame, and consequently is not depleted of its oxygen as in the case of open flame heaters.

◆

375—Kolstokers for Homes and Industry

Anchor Stove and Range Co., Inc., New Albany, Indiana, is distributing four new folders—Anchor Kolstoker cabinet models for homes, apartments, store rooms, and buildings using up to 150 tons of coal per season (Bulletin 1236); Anchor Kolstoker heavy-duty industrial models for factories, laundries, hotels, large apartments, greenhouses and large heating plants (Bulletin 336); Anchor Bin Feed Kolstoker, automatically feeding coal from bin to burner (Bulletin 636); and Anchor Kolstoker Anthracite Model (Bulletin 536).

◆

376—Fuel Oil and Equipment Survey

The Oil Burning Institute has had compiled during the past year a survey of statistics from all known authentic sources covering fuel oil and oil burning equipment.

The relationship of increasing fuel oil consumption and the widespread growth of oil burning equipment for heating is accurately and interestingly reflected in the statistics and charts compiled therein, they say.

This rapid development has taken place over the past fifteen years, and from the data presented it is possible to project with some assurance the potential market for continued and sound expansion of public acceptance of oil as a fuel.

This information is now presented in bound form with a number of charts and is subdivided into sections A, B, C, D, E, F, and G covering respectively: Trend of crude oil, trend of fuel oil, comparison of fuels, growth of oil burner industry, development of oil burner apparatus, trend of automatic heating installations, and potential demand for fuel oil.

Copies may be obtained from the Oil Burner Institute, 30 Rockefeller Plaza, New York City, of which G. Harvey Porter is managing director.

With The Manufacturers . .

A. C. Parts and Accessories Distributor

The Borg Warner Service Parts Company, 2100 Indiana Avenue, Chicago, has announced its entry into the distribution of parts and accessories used in automatic heating and winter air conditioning installations. It is planned that a large and complete stock will be carried and a nation-wide service instituted.

◆

Somers in Larger Quarters

H. J. Somers, president of H. J. Somers, Inc., Detroit, manufacturers and designers of air conditioning machines, air filters, automatic humidifiers and unit hay fever machines, advises that the revival of the building industry and its complemental effect on the heating, ventilating and air conditioning branches of the industry has forced his company to seek larger quarters at 6063 Wabash Avenue. The former factory was at 1984 West Lafayette.

◆

Penn Temtrol Award

Fred T. Hyde, installation man for Borstein Electric Company, Camden, New Jersey, oil burner dealers, was named winner of the grand award made by Penn Electric Switch Co., Des Moines, Iowa, in connection with their 1936 Temtrol Meetings recently concluded. Second award went to Frank Schutze, stoker distributor of Peoria, Illinois, and third award was won by Myron Rogatka, retail salesman for Calkins Heating Company, Buffalo, New York, oil burner dealers.

Awards were made by a committee of business paper editors and representatives, together with Nelson B. Delavan and K. W. Cash of Penn Electric Switch Co.

◆

Lincoln Enters Sheet Metal and Heating Field

The Lincoln Plumbing Supply Corporation of 1600 Lincoln Avenue, Utica, New York, heating, plumbing and mill supply distributors, have recently added a department covering the sheet metal and forced air heating field. They have engaged George Sax and E. Cadwell to operate for them in the field, and are now contacting the various dealers in their territories. They intend to carry a complete stock of black and galvanized sheets in the various gauges, controls, registers and grilles, and forced air furnace fittings, as well as all specialties.

◆

Advertises Automatic Heat and Air Conditioning Industry

Coining the new expression, "Inside Weather," Minneapolis-Honeywell Regulator Company, Minneapolis, is devoting its entire fall advertising campaign to the sale of automatic heating and air conditioning equipment. "We fully realize that our success and the success of the Automatic Heating and Air Conditioning industry is inseparable," George B. Benton, Advertising Director, said.

National magazines, such as the Saturday Evening Post, Time, Collier's, American Home, House Beautiful, House and Garden, Business Week, Nation's Business, and the New Yorker are being used in addition to leading newspapers from coast to coast.

In addition to broadsides describing the campaign, dealers are supplied with window displays and posters.

News Items . . . . . .

N. W. A. H. & A. C. A. December Meeting

The next meeting of the National Warm Air Heating and Air Conditioning Association will be held at the Stevens Hotel, Chicago, on December 15, 16 and 17.

Allen W. Williams, managing director, advises that there will be a meeting of the board of directors and committees on the 15th with the convention sessions on the 16th and 17th.

The program is planned to serve and evaluate present and future conditions and the latest developments in merchandising, engineering, publicity and design.

◆

U. of I. Circular No. 26

The University of Illinois, Urbana, has published a circular which contains all the papers presented at the first annual conference on air conditioning which was held on May 4 and 5, 1936. The circular contains eleven papers dealing with all phases of air conditioning including such topics as hay fever, air filters, fuel saving, and summer cooling. The University will supply, for a limited time free of charge, single copies of the circular. Address:

Circular No. 26—Papers on Air Conditioning Conference, Engineering Experiment Station, Engineering Hall, Urbana, Illinois.

◆

George S. Auer Passes

George S. Auer, president of the Auer Register Company of Cleveland, died in that city on September 23, at the age of nearly eighty years. A pioneer figure in the heating industry, Mr. Auer was a manufacturer of warm air registers for fifty years. His business was originally started in Toledo, later moved to Cleveland, and the present company was organized in 1907. Mr. Auer was one of the first manufacturers of all-steel registers and one of the originators of the baseboard register. He was widely known and respected in the trade, and his death removes from the field one of its leading personalities.

The Auer Register Company will continue under the management of George G. Auer and George R. Metzger, nephew and grandson respectively.

◆

Six-Week A. C. School

C. W. Whitney, president of the ABC Oil Burner & Engineering Co., and Mitchel Landau of the Acme Tin Plate & Roofing Supply Co., 10th & York Sts., Philadelphia, inaugurated a school in air conditioning on Tuesday, September 29, to continue every Tuesday at 8 p. m. for six weeks. Sessions are being held at ABC headquarters, 2012-14 Chestnut Street, Philadelphia.

Mr. Landau believes that dealers will get a larger share of automatic heating and winter air conditioning business if better informed on technical and selling phases.

Among the subjects to be discussed are:

Taking the mystery out of Btu.

How to properly figure the heat loss of any job.

How to figure the job for gravity or winter air conditioning.

How to convert a gravity into a winter air-conditioning installation.

Application of automatic oil burning to any warm air or winter air-conditioning system.

Discussion of cast-iron and steel furnaces.

Effect of humidification.

Use of waterbacks.

Effective selling of automatic heat and comfort instead of just a furnace.

Enterprise Adds Furnace Repairs

Enterprise Furnace Manufacturing Co., 202 W. Main St., Jackson, Tenn., has installed a furnace repair department with complete equipment and estimate facilities.

◆

McInturff Shop Active

McInturff and Sons' shop is active at 904 Eighth Ave. South, Nashville, Tenn. It is conducted by the sons of the founder who died in recent years.

◆

Burnett Adds Furnaces

H. M. Burnett Roofing Co., 918 Eighth South, Nashville, Tenn., has added furnaces and installation. In early September the company installed several jobs in apartment houses on the south side.

◆

Adds Sheet Metal Department

Franklin Junieston Co., 612 Tenth Ave. North, Nashville, Tenn., now have a sheet metal department and it is very active. The company has just been awarded contracts for the government housing projects—copper, guttering and roofing in North Nashville.

◆

Dauntless Activity Increased

Dauntless Sheet Metal Works, 104 Sixth Ave. South, Nashville, Tenn., has been active in sheet metal work in Nashville for about fifteen years. Manager George W. Simmons said the summer of 1936 showed improved trade, though the roofing trade was not so extremely brisk. The shop has some good trade mottos, is finely equipped, has motorized delivery and a good interurban as well as city trade. Its floor space is one of the largest in the central uptown sheet metal district.

◆

Wessendorf, Memphis, Incorporated 25 Years

Just twenty-five years ago (Aug. 10), The C. Wessendorf Company, Memphis, Tenn., capitalized at $20,000, applied for a charter. The incorporators were C. Wessendorf, George Schaefer, F. B. Hunter, Marie Wessendorf and J. E. Richards, Jr. This sheet metal and furnace concern on Washington avenue is one of the oldest plants in this industry in the mid-south. Mr. Wessendorf had established it many years before it was incorporated and for several decades it has operated in the same section of Memphis.

◆

Shortage of Airplane Sheet Metal Workers

Because of the shortage of sheet metal workers in airplane factories, particularly on the Pacific Coast, where the plane plants have nearly $30,000,000 in unfilled orders, and the inability to supply the calls for this type of worker, the Boeing School of Aeronautics at Oakland, California, a division of United Air Lines, announces a new course to train men for the airplane sheet metal craft.

The three months course includes 360 hours of shop work, wherein the student becomes familiar with hand, bench and floor tools. He then gains experience in forming and fastening operation, with experience in riveting by hand, gun and pneumatic press. Considerable attention is also given to methods of preventing corrosion and abrasion, and to the heat treatment of aluminum alloys in both electric and gas type furnaces. The metal shops in the Boeing School of Aeronautics are fully equipped with all modern tools and machinery required in the building of complete metal airplane structures and in fact complete all-metal airplanes actually have been constructed at the Boeing School.

Soldering Bright Metal

(*Continued from page 27*)

with a higher tin content, such as 60-40 or 70-30, stating that such solders have extra strength and stay liquid in the joint more readily, thus reducing the actual soldering operation cost, even though the cost per pound for the solder may be slightly higher.

Upon completion of the soldering operation the joint should be washed well with soap and water in which five to ten per cent of washing soda has been dissolved. The material should be wiped off afterwards with a clean cloth, which prevents reaction of any excess flux on the bright metal surface. The soap and soda solution tends to neutralize the extra strong flux used.

It may be of interest to note that some of the manufacturers of bright metals recommend that the edges to be soldered be roughened up with sandpaper or other non-metallic abrasives in order to insure proper soldering reaction. Also some of the manufacturers state that a higher than usual soldering iron temperature is not injurious to the material. Silver solders are recommended by some of the manufacturers, a popular solder of this type containing 53 per cent copper 15 per cent nickel, 15 per cent zinc, and 17 per cent silver. A hard solder sometimes used is composed of 38 per cent copper, 24 per cent silver and 38 per cent zinc.

Bright metals ordinarily include the bonded materials now on the market where a bright metal surface is applied to a base metal of other characteristics. Where the base metal is zinc, muriatic acid cut with zinc clippings should be used as the flux. Half and half solder with a moderately hot iron used while the surface to be soldered is still moist with the flux and the application of heat through a heavy soldering iron is suggested.

Where the product being soldered has large flat surfaces, some manufacturers recommend that in order to prevent buckling in the sheet due to the high coefficient of expansion, chill plates preferably of copper applied adjacent to the soldering area be employed.

Because bright metal has high physical characteristics and a high coefficient of expansion, it is usually recommended that the solder be depended upon for nothing more than to make a tight joint. The mechanical bond should be strong enough to take care of any stress. Many contractors have found that soldered lock seams do not remain tight over a long period, due primarily to the fact that in lock seaming it is generally impossible to have the lock seam itself perfectly tight. In joints which cannot be made tight by locking and soldering intermittent spot welding may be employed to make the joint strong with soldering used to make the joint tight.

Lead Work on N. Y. Court House

(*Continued from page* 18)

sheets had to be bent back for the joint, when the sheets were flat, a second bend across this first one would crimp the first bend tightly together at the intersection of the two bends and it would then be impossible to make the joint. To overcome this problem, pieces of leather belting ⅛-in. thick were placed in the first bend where the second bend was crossing. Then, when the second bend was made, the leather prevented crimping of the first bend and after all bends were made, the leather was removed.

The entire floor of the porticoes was waterproofed with sheet lead. It will be noted that the base of some stone columns rest over square raised pedestals, and the lead undercoating is turned up several inches along the side of these large pedestals. A separate, inverted lead pan was then made for each column and was placed over the raised base, overlapping the lead waterproofing turned up the side by six inches.

The detail sketches indicate that a large amount of reglet caulking was necessary along ornamental belt courses of masonry. Where the lead flashing is caulked into reglets in the stone work, continuous lead locking strips were first caulked into the reglets and the lead flashing was loose-locked to these strips. This is indicated on a number of the detail sketches. All gutter linings are constructed similarly to the cornice covering with loose locked cross seams at approximately 8 ft. intervals. Flashing is installed to overlap base flashing with loose-locked cross seams. The base flashing is run under the walking tile deck. In some instances this underlying lead is entirely concealed. Where the lead sheets are fastened along corner edges continuous lead cleats were fastened to the stone by means of lead plugs and brass screws inserted in holes drilled in the stone. The lead cornice covering or flashing is loose-locked to this continuous lead cleat. All such joints are filled with non-hardening compound.

Several of the flashing details indicate the construction for the connection of pan or floor sheets to reglet cleats. The details also show the formation of loose-lock seams along the upper edge of projecting cornices and belt courses and the formation of lead drips at the exterior edge of the masonry. The details also show the insertion of through-wall flashing or base and cap flashing along masonry sections.

One of the interior photographs of the tower shows lead undercoating turned up around the bases of walls and columns to form a complete waterproofed pan for the tower room.

Foundation waterproofing was considered highly essential in view of the fact that the building is erected over an old pond and as a result large amounts of water were encountered in the excavation work. Soil conditions at the building location are such that it was not possible to reach rock. The building is therefore

(*Continued on page* 100)

Overton's Factory Heating

(*Continued from page 23*)

we assume a combustion rate of 13 pounds we have 97 divided by 13 equals 7.46 sq. ft. of grate surface.

Fans for factory installation may have higher outlet velocities, and greater tip speed than fans installed in churches, schools, or theatres. Hence we choose a fan to deliver 8000 c.f.m. against ½-inch static pressure. Fig. 14.

We will require a motor of 3 H.P.

Note: Assume ground under floor at 45°, making a temperature difference of 60°—45° or 15°.

Our total loss from building is therefore, 1,217,300 Btu. per hour, and this loss must be supplied by the heating apparatus.

If heating plant is operated in day time only, add 10% to above losses for heating up in the morning.

If plant is not operated for the period over Saturday and Sunday, add 20% to heat losses. Some factories have installed exhaust or fresh air systems for various machines or equipment. This loss must also be estimated and additional heat supplied.

For example: In the building above there is an exhaust system removing 30,000 C. F. M. from the building, which means that 30,000 C. F. M. must be supplied in new outside air. We would have to supply with the heating system sufficient Btu. to replace 30,000x60= 1,800,000 cubic feet per hour at a temperature of 60°.

			Btu. Per Hr.
Cubical Contents: 200′x75′x20′=300,000 cu. ft. Infiltration—1 change per hour or heating up 300,000 cu. ft. from 10° below to 60 or 70°. Using Rule No. Two (2): Engineering Letter No. 1—			300,000x70=380,000 Btu.
			55.2
13″ Brick Wall— 550 length x 20′ height=11,000 sq. ft.			
Minus windows in wall=	2,400 sq. ft.		
	8,600 sq. ft.	Temp. Coeff. Diff. x 0.278 x 70	=167,300 Btu.
Single Glass Windows in Walls: 30 — 10′ x 8	2,400 sq. ft.	x 1.13 x 70°	=190,000 Btu.
Roof:—2″ Wood under composition: 200′ x 75′	15,000 sq. ft.	x 0.35 x 70°	=367,500 Btu.
Floor—Concrete: 200′ x 75′	15,000 sq. ft.	x 0.50 x 15°	=112,500 Btu.
		Total	1,217,300 Btu.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 114.

377—The Rochester Humidifier

Rochester Manufacturing Co., Rochester, N. Y., is distributing a new leaflet describing the Rochester Humidifier, which uses waste chimney heat to humidify the home. The Rochester humidifier is attached at the back of the furnace, ahead of the chimney pipe, thus delivering superheated steam to the bonnet of the furnace. The unit is a stainless steel evaporator with a heating surface of 1400 square inches.

The makers claim the Rochester humidifier reabsorbs upwards of 5 per cent of the waste heat usually lost up the chimney, and that it gives fully adequate humidification from otherwise wasted heat.

◆

378—Peoples Silent Oil Burner

The Peoples Oil Burner Co., 466 West Superior Street, Chicago, makers of the Peoples Silent oil burner, is distributing a new 4-page folder, in which they claim 100 per cent hydroxylation, thus reducing fuel consumption and giving operating costs comparative to coal.

The Peoples Silent oil burner is made in a range of five sizes for residences of from six to eighteen rooms. The leaflet shows installation of water heater burner and explains flame characteristics of the heating burners.

◆

379—Practical Air Conditioning

"Practical Air Conditioning" is a new book by Harold L. Alt, in which he gives practical examples of how to install air conditioning equipment.

The author takes a small office, a double office, a hospital room, a hospital ward, a small movie, a theater, a small and a large shop, a department store and a living room, and in each case gives a layout of the job, tells the conditions surrounding it, the results desired and then has worked out step by step the problem of installing the air conditioning equipment. Each factor that must be taken into consideration is treated separately in detail.

The book contains 259 pages, all thoroughly indexed. Many tables and charts are shown and it is illustrated throughout. Published by Domestic Engineering Publications, 1900 Prairie Avenue, Chicago, Illinois.

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American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Check numbers in which you are interested):

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371	372	373	374	375
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New York Court House

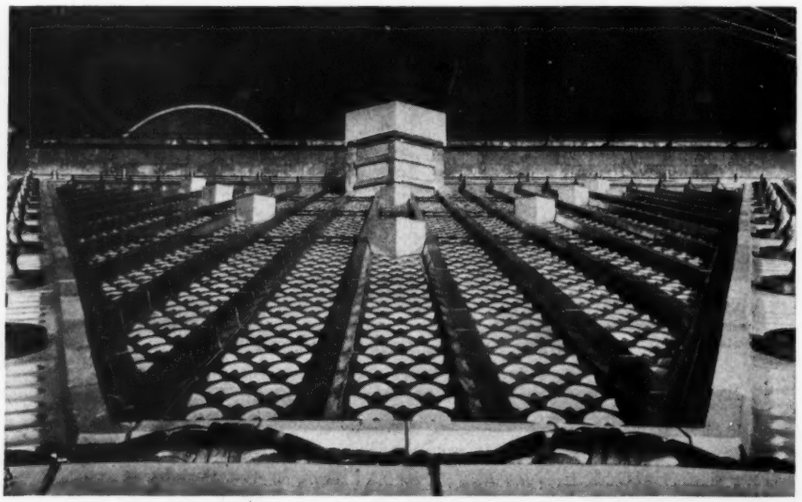
(*Continued from page 97*)

supported on concrete piles driven to an average depth of 45 feet. Over the top of these piles a concrete slab was placed and under the tower section of the building there is an enormous concrete mat on which the column footing rests. Because of these peculiar conditions it was necessary to waterproof the entire basement similarly to the construction of a ship's bottom. The column billet plates are set in depressions in the concrete foundation slab about 18 in. deep with sloping sides. A cement grout ½-in. thick was laid to a true surface over the rough concrete of the mat, and on top of this concrete grout a lead sheet was laid as shown in one of the details. The lead was worked down into the bottom of the depression and extends up the sloping sides. Membrane waterproofing was wrapped both over and under the lead waterproofing so far as possible. On top of the lead there is another ½-in. of cement grout on which the billet plates rest. Membrane waterproofing is carried several feet up the column and a solid concrete block is poured around the billet plate.

Glazed Tile

The shiny roof which appears in several of the photographs is, as stated, blue and gold glazed tile. The vertical ribs which show in the photograph on this page appear to be metal, but are tile. The spear heads look like metal, but these, also, are tile.

The ribs referred to, are so formed that the units fit over the batten metal ribs beneath. Examination of the photographs and details will show how these tile units were cemented in place.



Looking down the main roof showing tile ribs underneath which are the lead covered ribs shown in the drawings.

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October, 1936

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